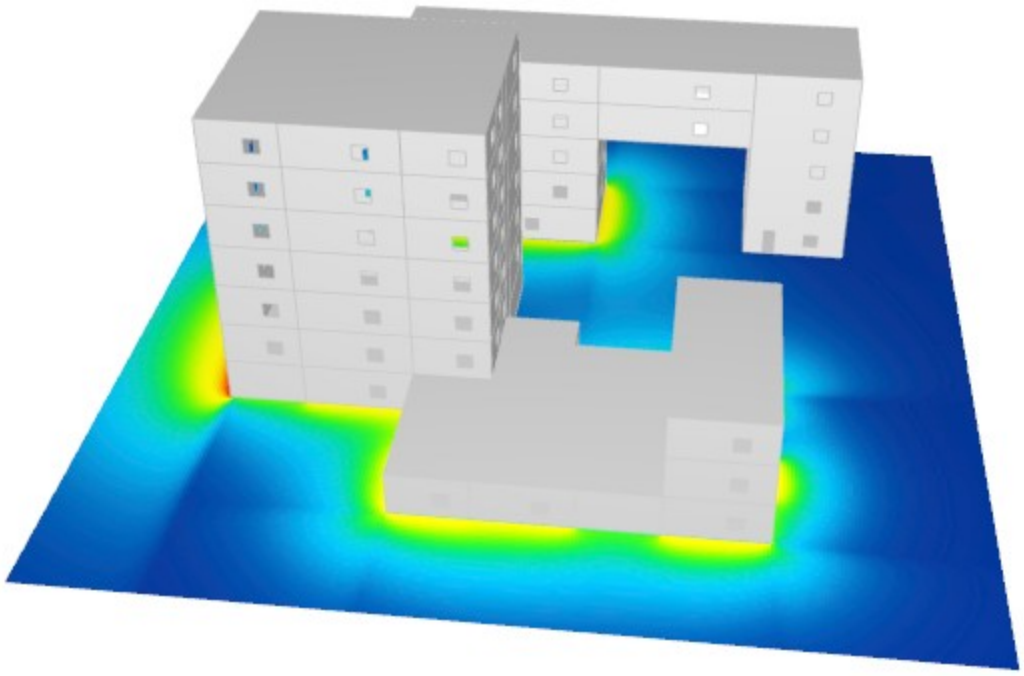
User Manual

SONarchitect® ISO



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Welcome

SONarchitect ISO, the ultimate software for the computation of the acoustic insulation in the entire building

In this document we will try to guide you through your first trip with SONarchitect ISO. After that, you will be able to develop an acoustic project of an entire real building.

User Manual

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Chapter 1

Intro

1 Intro

Welcome to SONarchitect ISO v2.2, the ultimate software tool for computing sound insulation according ISO EN 12354 parts 1,2,3,4 and 6 in the entire building.

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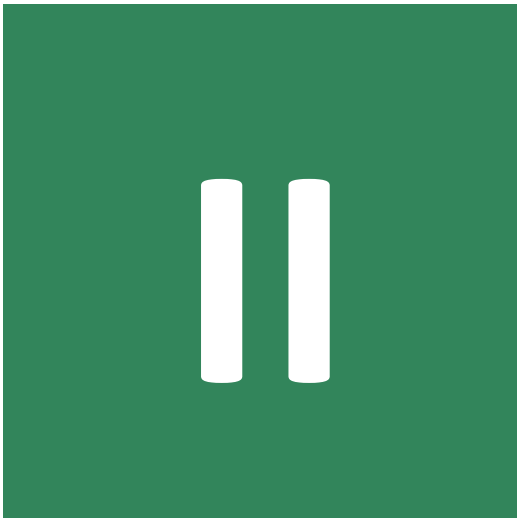
Chapter



Getting started

2 Getting started

Here you can learn the first steps with SONarchitect ISO. Double-click the icon in your desktop to run SONarchitect ISO.

If you have a Professional or Educational version of SONarchitect ISO, ensure that the security hardlock is connected to a USB port of your PC. If you have the Demo version you do not need the hardlock to run the program.

Hardlock

You can check the Help Manual by pressing the F1 key or the Help button , and you will find some additional information.

Let us help you create your first SONarchitect ISO project.

After launching SONarchitect ISO press New project in the toolbar. You may notice that SONarchitect has not a menu bar. All the SONarchitect functions are accessed via the buttons in the toolbar.

Let us draw our first building. Insert some information in the New Project dialog box such as project name, Building Code requirements or the default materials for roofs, floors, and walls.

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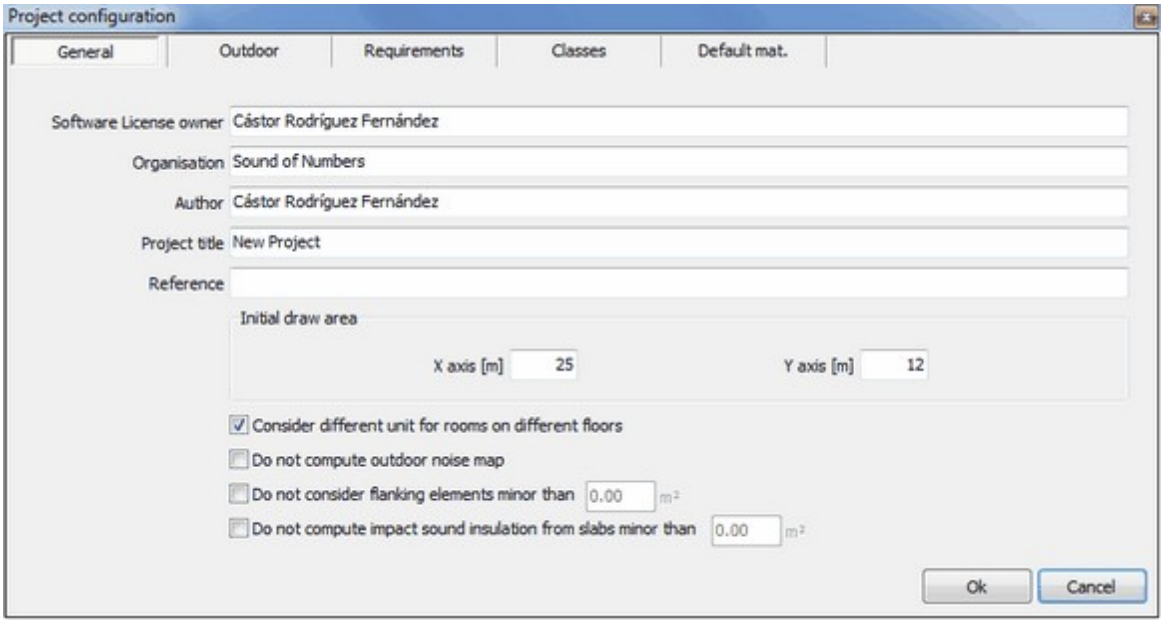

You may save the default material set to use them as defaults in other projects. By now it does not matter what you choose since this is a toy project. Press OK and SONarchitect will ask you for the first plan details (name, height, and repetitions). You can change these at any time later. By now let us call "General" the first plan, 3 m high, and just one repetition. Then you will access the drawing canvas and tools. Let us start!

2.1 Drawing

Find the Plans button and press it. A panel will appear on the left with the Plan list and Tracing (imported templates) plans. Here you can create new plans, copy them to create similar floors, change their order in the building, etc. Buildings in SONarchitect are composed by floors which are created from repetitions of plans.

We will begin by drawing a first floor that we have called "General", 3 m high, and which will appear in the building only once. The drawing mode must be active. Click

Select the Pen tool and draw an horizontal line in the lower part of the screen. To do that, click and release the left mouse button to start the line and then move the mouse to

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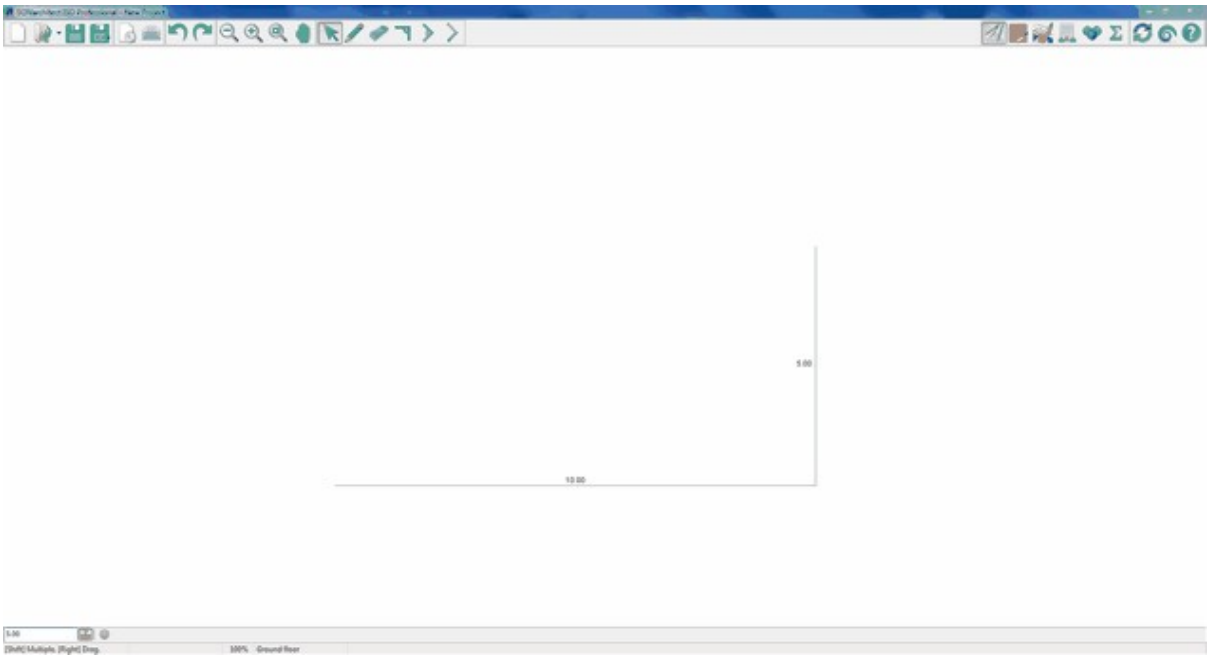
the right. To get a perfectly horizontal line, press Ortho Global tool or CTRL key while moving the mouse. The text box at the lower left corner shows the real world length (in meters) of the line that you are currently drawing. If you want to specify a given length for your line just write it (the numbers you type will appear in the text box) and press ENTER. When using only the keyboard, as you have to release CTRL to enter the length, you can lock the drawing tool by pressing the space bar before releasing the CTRL key. Thus you ensure that no accidental mouse displacement can spoil the horizontality of the line. Pressing the space bar again unlocks the drawing, in case you change your mind. Try with 10 meters.

Now move the mouse upwards. You will see that, by default, you are drawing a new line beginning at the end of the one you just finished. If you would not want another line now, you would press ESC. But we will draw now a perfect vertical line, so press again the CTRL key. Lock the drawing tool with the space bar, type 5 and press ENTER to get a 5 m line.



We want to close a rectangle in a right angle, so click or press the “X” key to enable “Normal” detection. When “Normal” detection is enabled the label "Normal" appears in the status bar. Check it.

Now, to draw the upper side of the rectangle, press CTRL while moving your mouse to the left. If “Normal” detection is enabled, a dashed blue line will appear when you come close to the zone where the line should end to form a right angle. The blue dashed line means that your line would end at a point where a normal (the blue dashed line) from a previous line end would meet your line. When you see the blue dashed line click to draw the line.

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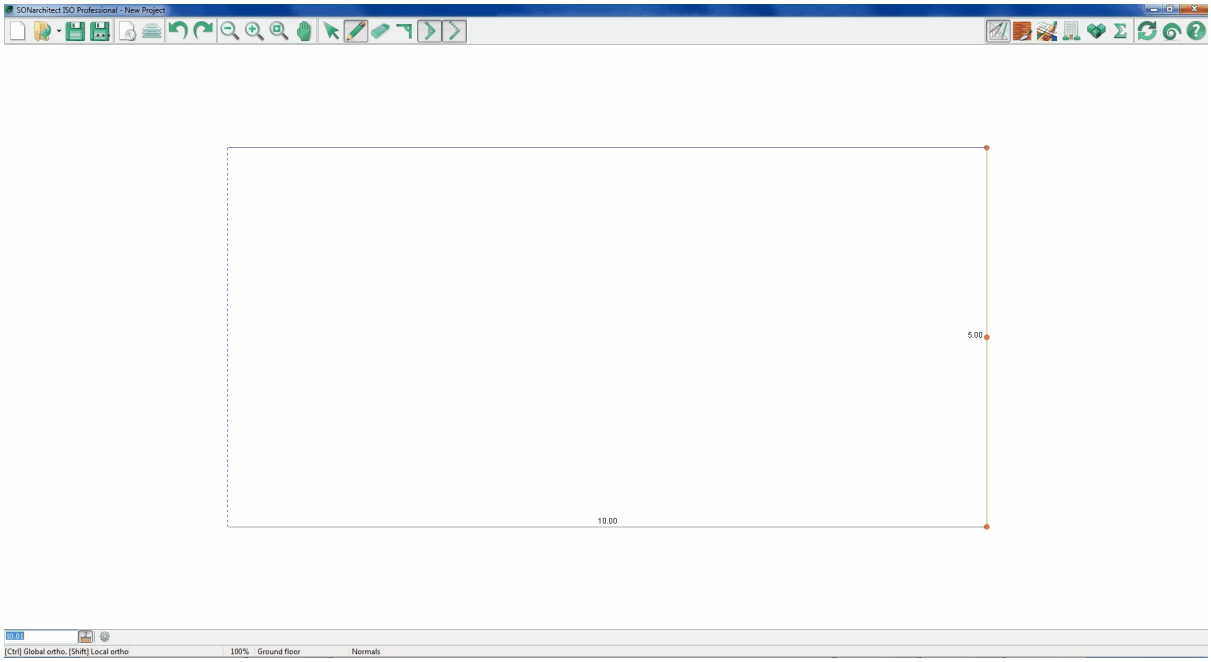
Finally, click the right mouse button to automatically close the polyline. By right clicking you will close the polyline as long as the polyline starting point remains unconnected. If it has been modified by the drawing supervision rules, which prevents geometrical artifacts without architectural sense, and manages the matching between plans and rooms, the polyline will not be automatically closed. If the starting point is not free, right clicking just ends the drawing pretty much as the ESC key.



Now we have a perfect rectangle!
Move the mouse over the bottom line of our rectangle. You will see that the cursor sticks to the line and to its singular points (center and both ends). Draw a line from the center of the bottom line to the center of the top line. You do not need to press CTRL to ensure verticality in this case, as with two perfectly matching lines, from center to center verticality is guaranteed. You have just created you first two rooms.

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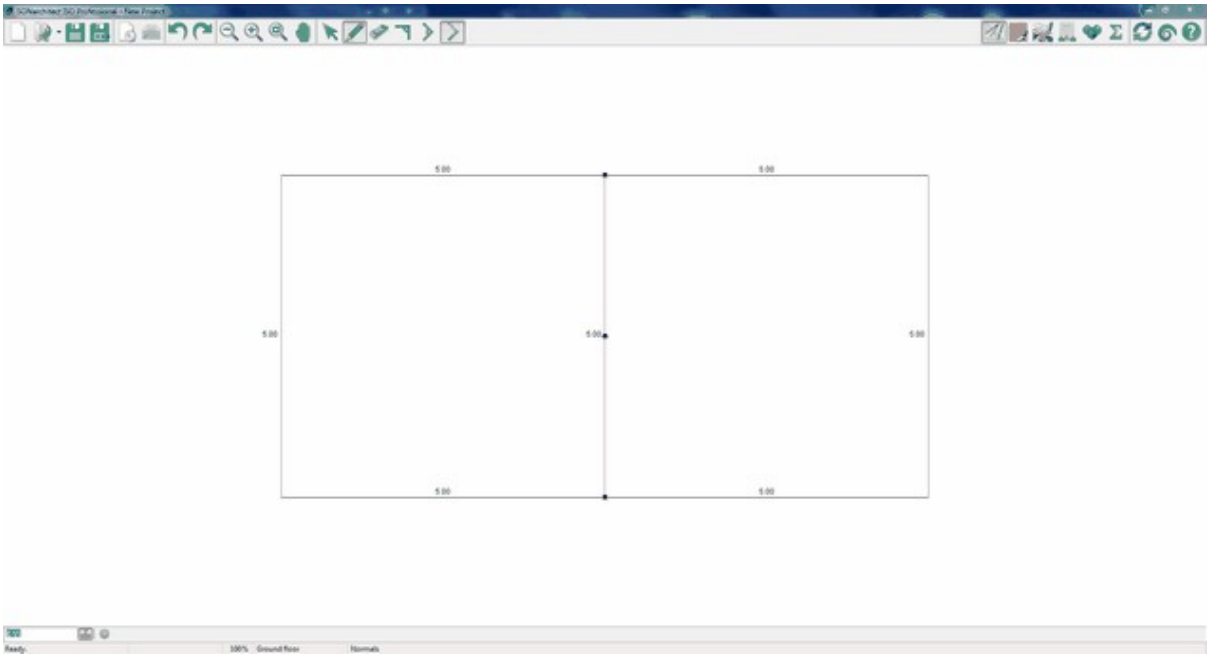

2.2 Inserting plans

Press the Plans button in the toolbar, and create a new plan by pressing . The new plan will source four floors of dwellings of our toy building, so name it "Dwellings", or similar, and specify 4 repetitions in the New plant dialog.

Note that all plans have a small icon with an eye . This allows you to make visible or invisible the different plans, to use them as guides for other plans. The current plan, the plan that you are editing, is the one selected in the Plans list, and it is shown in solid black lines in the drawing area, while the rest of visible plans are shown in light gray. The current plan name is shown in the status bar. Ensure that the current plan is Dwellings and that the first floor plan, General, is visible.

Use the Pen tool to draw in Dwellings an outer contour matching that of the General plan. Note that this could also be done by copying the "General" plan using the button in the plan list, and then deleting the inner vertical line in the new plan, selecting it after clicking and delete it pressing "Delete" in the keyboard or clicking . With time you will

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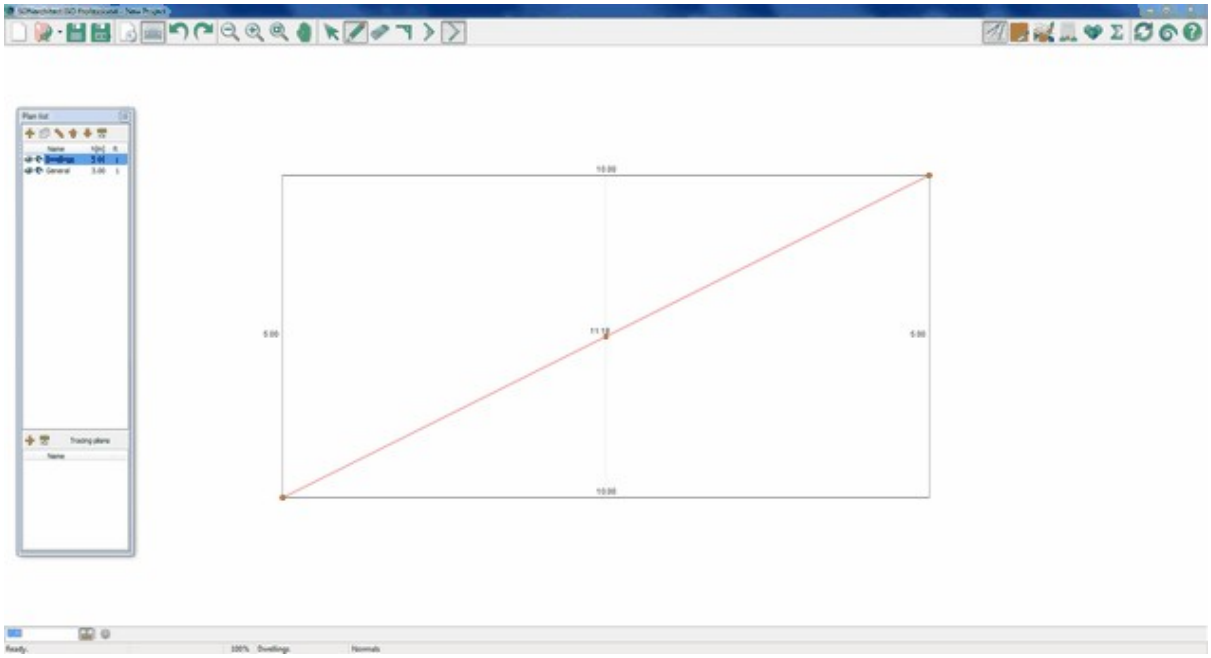
learn all the tricks that will allow you to work with SONarchitect at cheetah speed. But for the moment, let us continue at snail pace.

Once you have the outer contour of the building in Dwellings, draw an inner separating line from one corner to the opposite as shown in the figure below.



Now click on the center point of the diagonal separator. This time click Ortho Local button or press SHIFT while moving the mouse. With the SHIFT key you force the line being drawn to be normal to the line at the starting point (if any). It is a "local ortho" mode. Remember that by pressing CTRL ("global ortho") you force horizontal or vertical lines (press CTRL and see the difference). Now using SHIFT draw a line from the center point of the diagonal line to the top line, as shown in the figure. Now Dwellings has three rooms! Note that you can see the General plan in light gray, which allows you to ensure proper matching of elements between adjacent floors with different floor plans.

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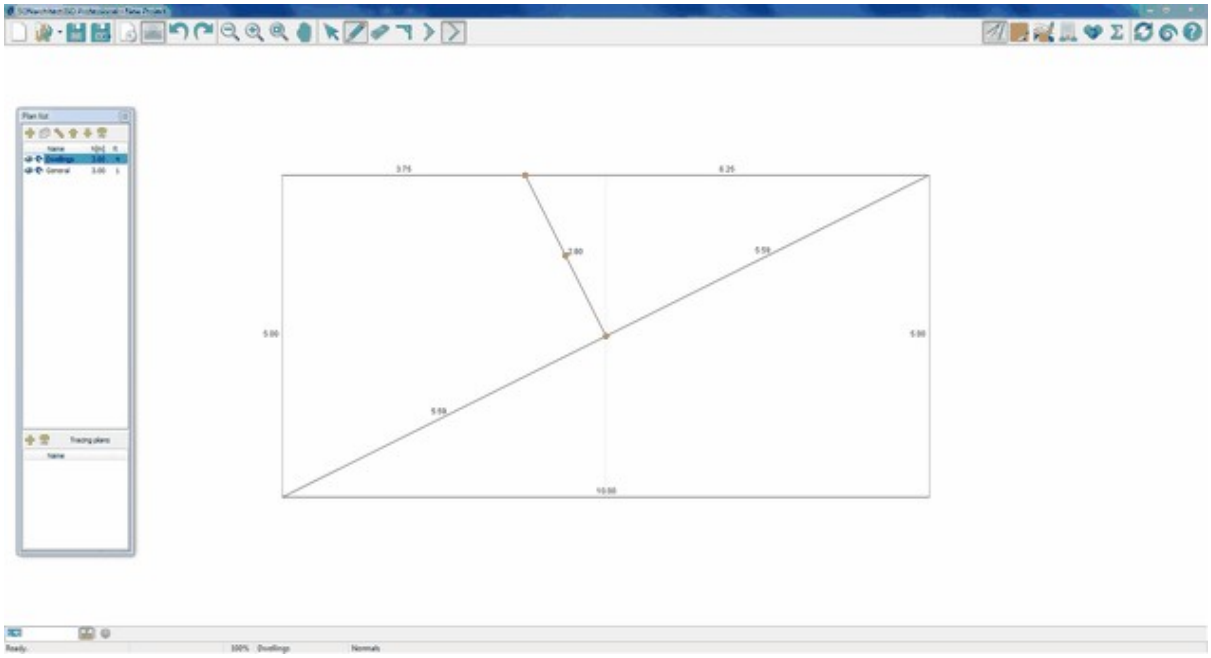

Now let us create the last plan, the attic, different from the dwellings plan. This time we will do it faster. Open the Plans list by pressing button. Select the dwellings plan and copy it by pressing . A new plan appears in the plans list ,with the same name with an apostrophe added at the end. Double click on the new plan and change its name to "Attic" or the like. Change the repetitions number to 1.

Press OK to go back to the plans list. Now press the small button with an upwards arrow to move the new plan to the top of the list, above the dwellings plan. The order of the floors in the building is given by the order in the plans list. You can change it at any moment as well as the repetitions of each plan, but it is a good advice that you draw your plans in the order they will appear in the building, to ensure proper matching between corresponding elements in adjacent floors with different floor plans.

At some point, SONarchitect will ask you to save the project. SONarchitect does not feel at ease if you have not saved your project for a while since you started. Once you have saved it the first time, for your safety, a backup copy of your project will be automatically saved every few minutes with ".bup" extension. You can see it in your working directory. However,

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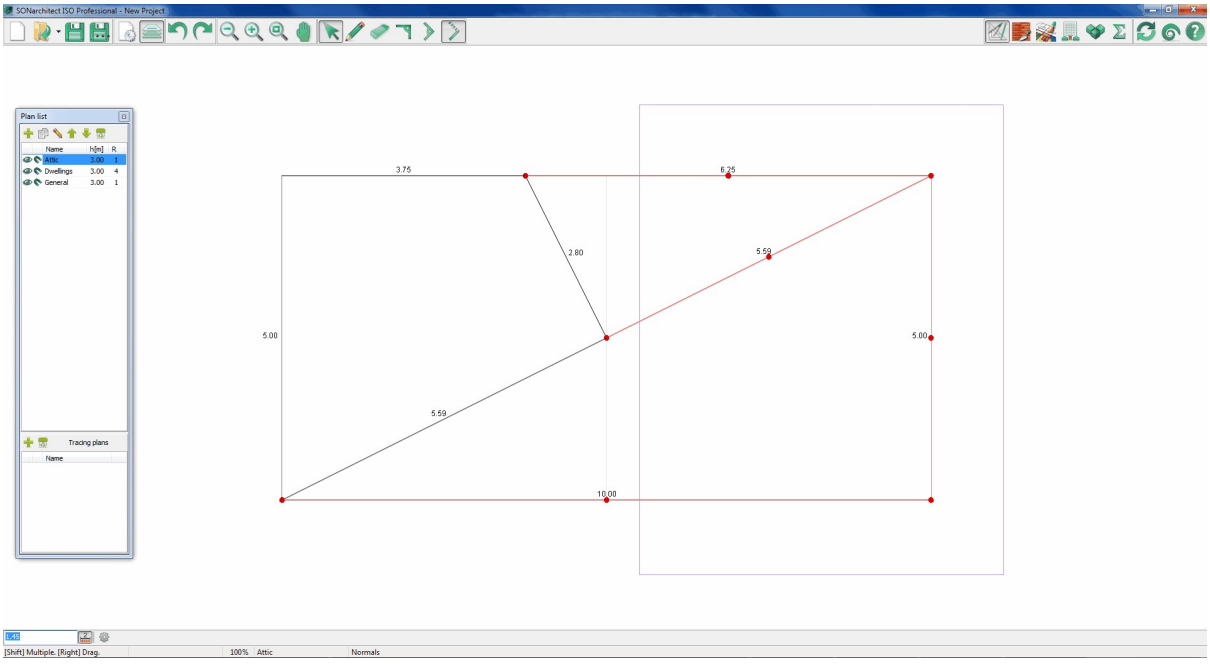
do not rely on the backup mechanism to protect your work. Remember to save your project from time to time, and it is always safer, in big projects, to save new versions of your project with different file names as you progress. Save your project with the name "Toy project" or something similar. The drawing canvas will resize from the initial default dimensions to your current building dimensions.
With the attic plan selected in the plans list, go to the drawing area and delete the four rightmost lines, keeping only the room on the left. Use the selection tool . You can select lines one by one, by left-clicking or by dragging with the right button of the mouse. If you drag towards the right, all the lines partially included in the selection box will be selected. If you drag towards the left, all the lines completely included in the selection box will be selected. Select the four rightmost lines, as in the figure, and press DEL to delete them, or press the rubber button in the toolbar.



We have drawn a toy building.

You can press the 3D button at any time to see the structure of your building. This is the 3D mode. Play with the 3D navigation tools, which will be very useful when browsing the calculation results. There are tools to drag or rotate the camera, and to orbit around the

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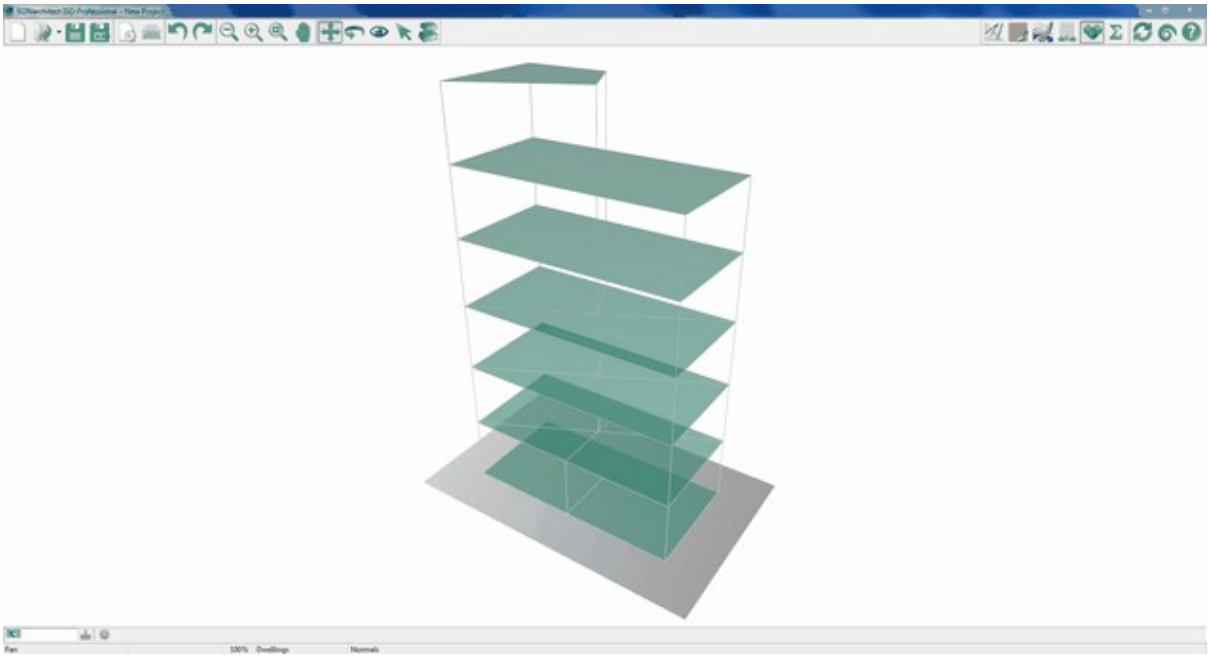
model. You can move forwards or backwards with the mouse wheel. By pressing CTRL while moving your mouse, you can translate the camera without changing your 3D navigation tool. If you lose sight of the building while flying around it, just click the restore view button.



2.3 Use units

Before assigning materials let us assign uses and use units. Each room in SONarchitect has an "Identifier", a "Use" and a "Use unit". The Identifier is just the room name, with no implications in the calculation, that you may chose at your will, but allows you to better identify the rooms in the results. The "Use" let you define the type of room. In SONarchitect you can define as many uses as you want in the Requirement settings.

The uses let you configure any Building Code requirements through the Project Configuration Form. There you can change the required parameters and quantities, which are defined from a given "Use" to another "Use". Do not try to completely understand the requirement configuration now. It will be clearer when we get to the results section.

Besides the Use, a room has also a "Use unit" identifier, which identifies all the rooms that belong to the same dwelling, habitation unit, or, in general, Use unit. Thus, in a dwelling, you have rooms with different Uses but with the same Use unit. The Use unit identifier can be as simple as a letter. SONarchitect distinguishes Use units in different floors, so you can use the same letters for any floors. You can configure this behavior through the Project Configuration form, for specific multiple floor Use units, such as duplex apartments.

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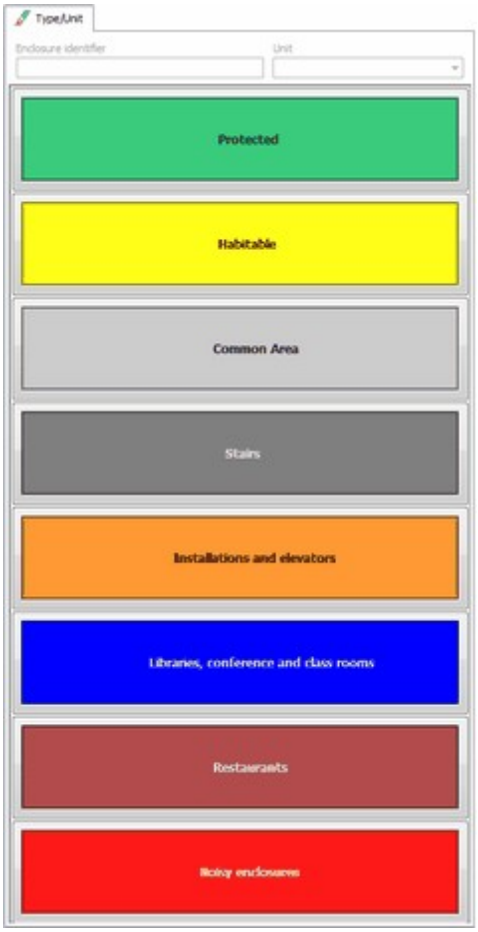
Let us assign uses to our toy building. Press and a panel will appear on the right. This is the Type/Units mode.

This could be an example of Uses definition.



Select the first plan, General, in the plans list. By right-clicking and dragging select both rooms. You can also do multiselection by picking while holding SHIFT. Assign a use, otherwise it will appear in light grey. Assign Common use. By selecting the rooms one at a time, assign a suitable identifier in the Enclosure identifier text box, such as "Entrance", for instance. Notice that the identifier is shown inside the rooms. Common area rooms do not need use unit identifier. By default they are always different from any other use unit, although you can modify this behavior through the Project Configuration form.

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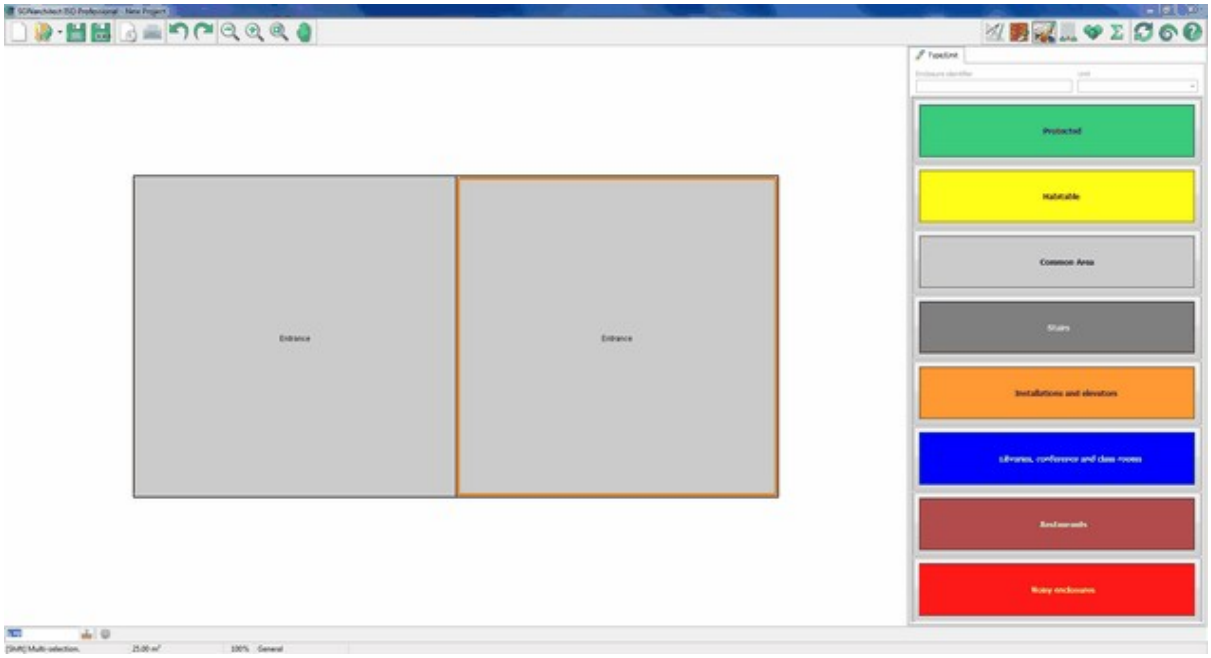

Go now to the dwellings plan. Select the biggest room (right bottom one) and assign a Protected use by clicking the Protected button. The room color changes to green, which is the color of protected rooms, as you can see in the corresponding button. As identifier you may write something like "Bedroom". Now select the left room and assign a Habitable use. The color should change to yellow. As identifier you may write something like "Bathroom". Select both rooms and specify use unit "A", by typing A in the Use unit text box. The “A” letter appears, in brackets, next to each room identifier and the line between the rooms is now thinner, as they belong to the same use unit. Finally, select the third room and assign to it a Stairs use. Its color should change to dark gray. Name it "Stairs", or similar. The result should look like the figure below.

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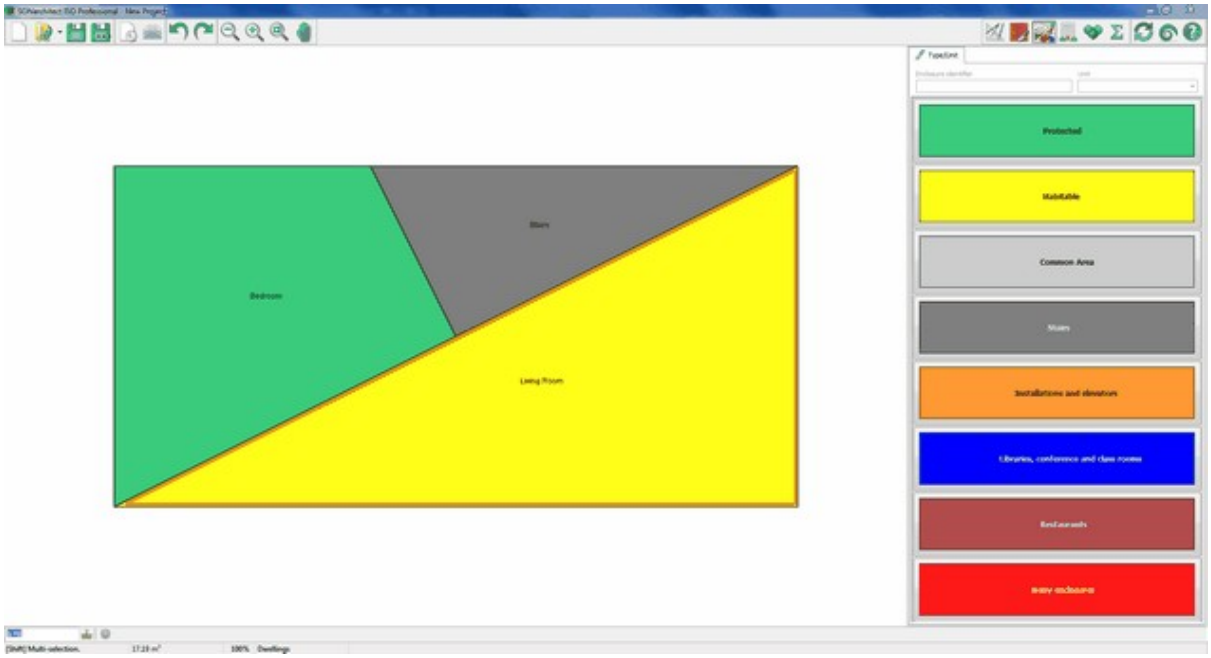
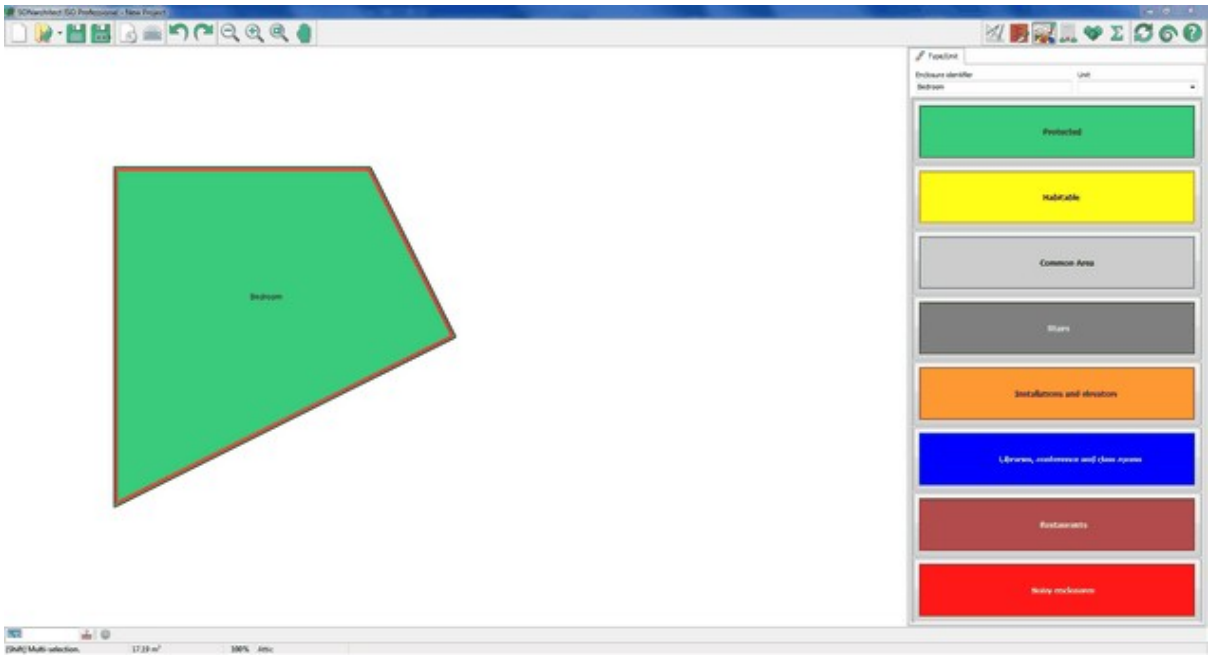


Go to the room in the “Attic” plan. Assign it a Protected use and name it "Bedroom". Use “A” as unit identifier.



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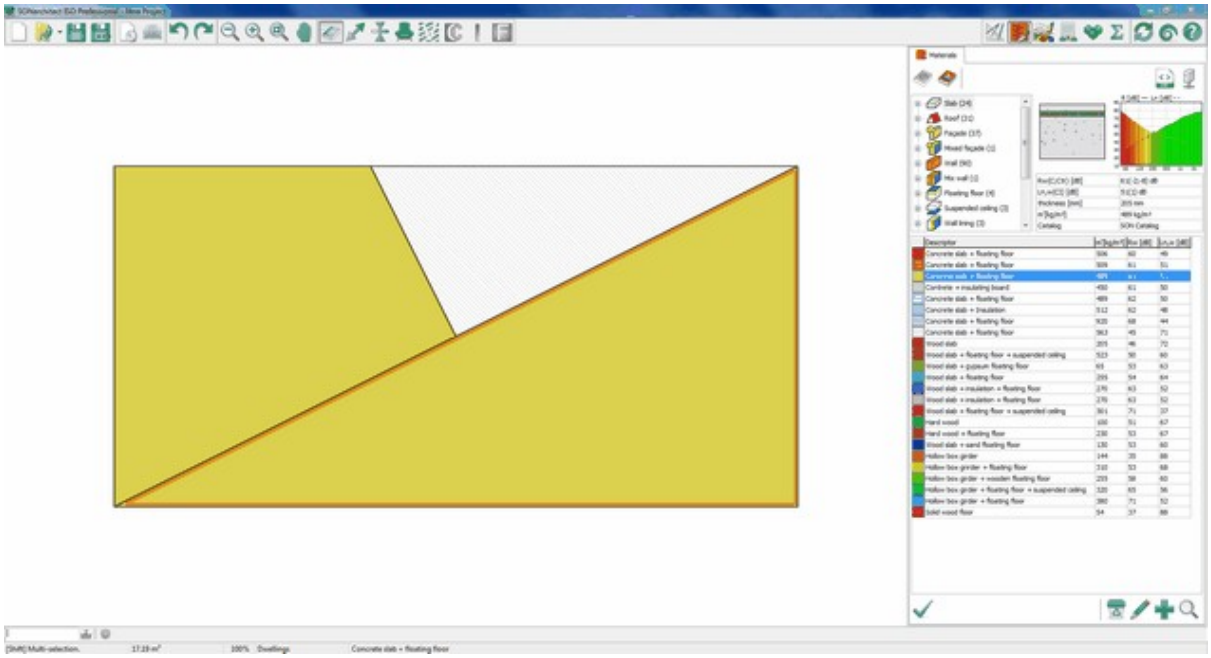
2.4 Slabs

It is time to specify the materials. Go back to the dwellings plan. Press the "Materials mode button" and the Materials Catalog will be shown. There you can select and assign all the materials for your building elements and linings.

First we will select "Slab" in the first material list. The rooms color will change to the color of the default slab solution you chose at the beginning of the project. Move the mouse over the rooms and you will see the material name in the status bar. If you want to change the slab material select the room or rooms, locate the material in the catalog and press the "Assign" button. The configurable colors in the material list provide visual feedback in the modified slabs.

For the "Stairs" enclosure we are going to manage a slightly more refined situation. Let us imagine that we have a lightweight stair in the room, such that the enclosure is connected from floor to floor. It is a unique enclosure 18 m high. To get it we just need to select the "Stairs" room and click the Virtual2D button or press the "V" key (“V” for Virtual). Thus you virtualize the inner slabs in a series of repetitions, i.e. you remove them from the building, connecting adjacent volumes between floors stemming from repetitions of the given plan.

Note that, by using the Vritual2D button or the “V” key, you virtualize the slabs only between plan repetitions. For other slabs, you must use the corresponding tool in the 3D view of the building.



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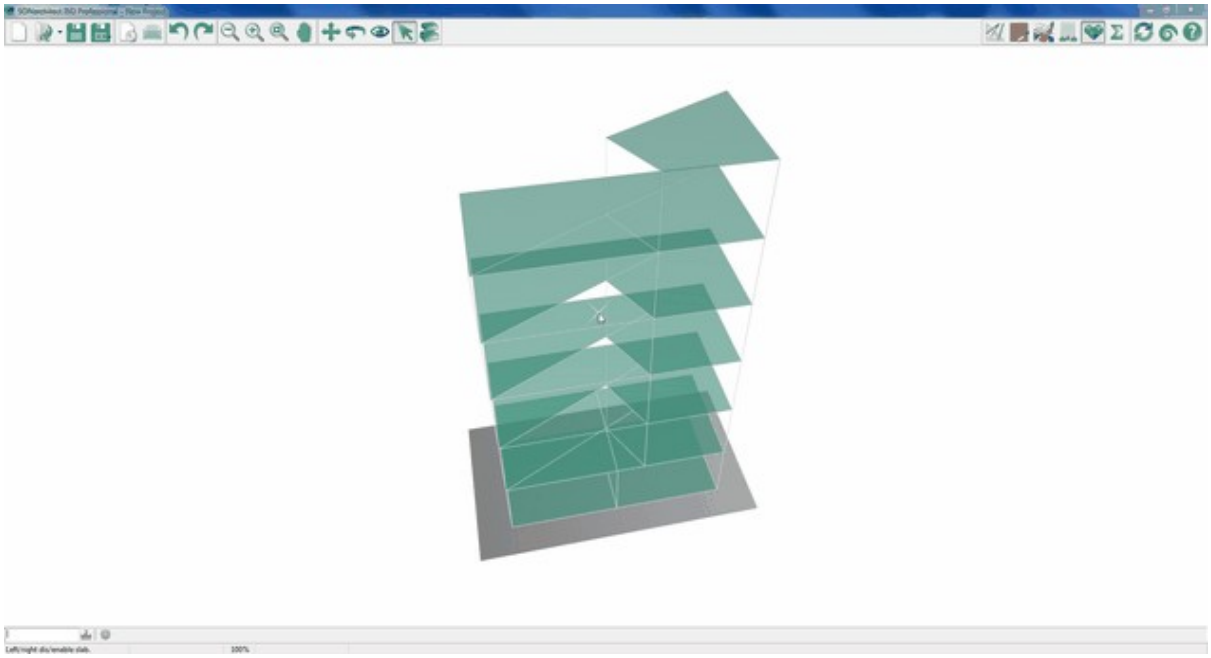
Thus, for instance, if you want to design an inner courtyard, you also need to virtualize the roof in the last floor repetition, and you must use the 3D virtualization tool in the 3D mode . You also need this tool to virtualize any slabs between adjacent floors with different plans.



2.5 Walls

Select now Walls in the material list. The plan scheme changes to show the vertical elements of the building, in the color of the corresponding default solution you have chosen at the beginning of the project. Now select Wall lining. The representation changes to show the wall linings of the building. When in light gray, no linings have been assigned yet. You may want to assign some or change the walls materials. To do that, just select the walls or linings, browse the catalog and press "Assign". Browse the different Subtypes and Catalogs through the lists in the Right Panel. If you are using the Demo version you will see only a few materials available, but enough to play with the toy building.

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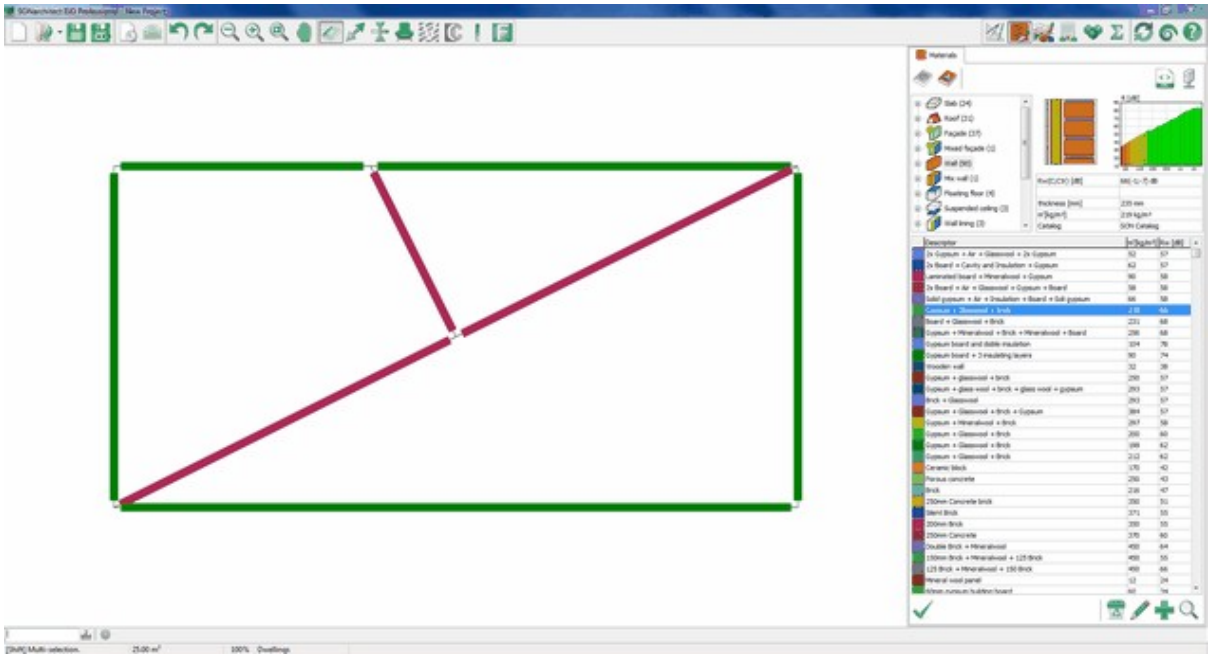

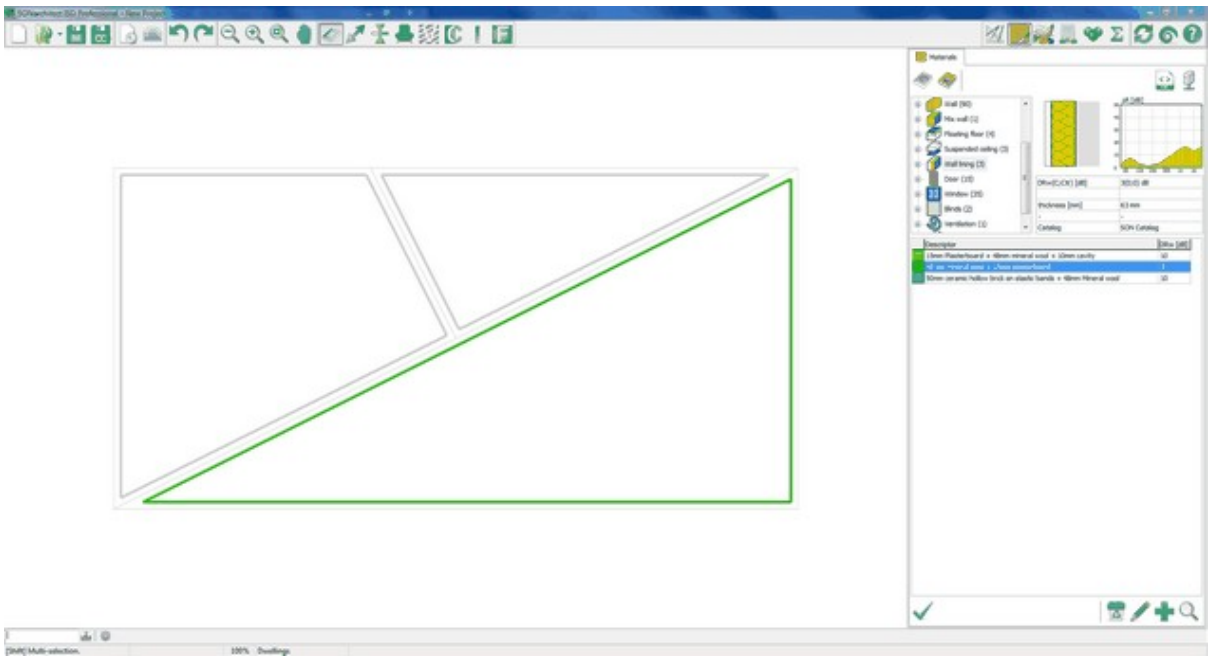

There are some shortcuts to ease the task of assigning materials. When you click inside a room, all the walls are selected or, if in Wall lining mode, all the inner linings. By clicking or pressing "F" (façade) all the outer walls of the plan will be selected. If in Wall lining mode, all façade inner linings will be selected. By clicking or pressing "I" (inner) all the inner walls will be selected, or the inner linings if in Wall lining mode.

When all the wall linings of a room are selected (by clicking inside the room in the wall

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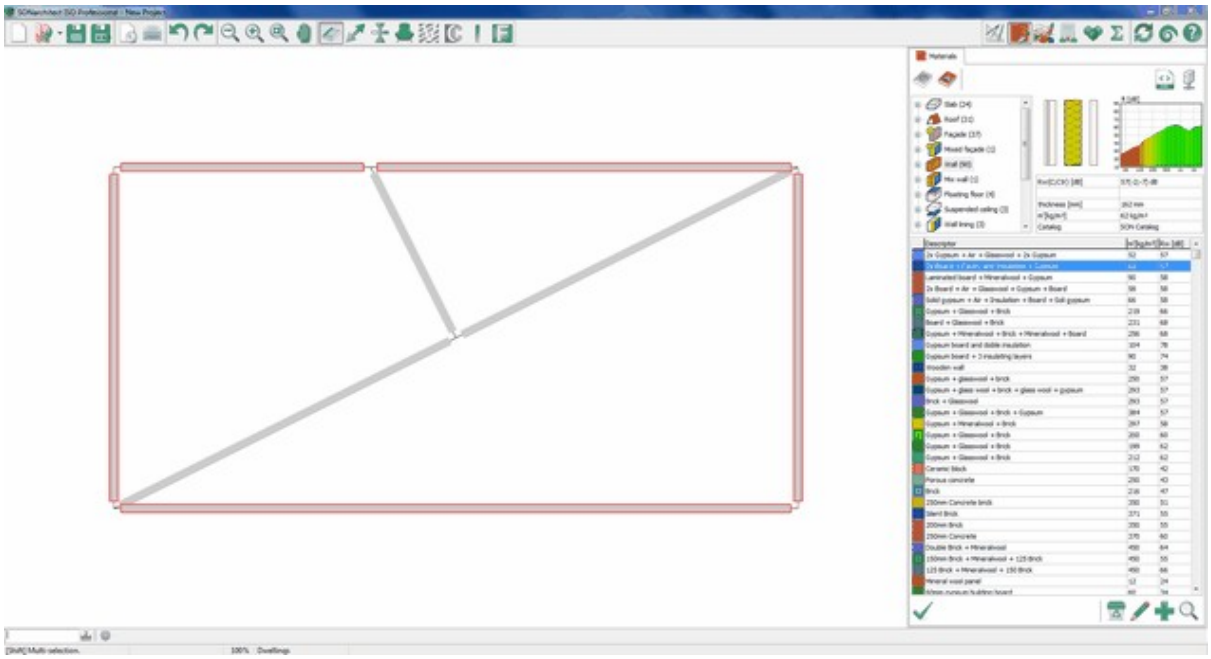
lining mode), a common area for instance, you can change the selection to the neighbor linings just by clicking or pressing "C" (complementary). This way you can quickly assign a common solution to every inner lining of all rooms adjacent to a common area, which, for our experience, saves a lot of time. “C” also works when only a few linings are selected.

Finally, if you select some walls, in Wall mode, and then switch to Wall linings mode, the selection will carry to the linings, i.e. all the linings of the previously selected walls will be selected.

Remember that for multiple selection you can use SHIFT and pick, or drag with the right mouse button, either to the left or to the right, depending whether you want strictly inclusive selection or partial inclusive selection.



F key - Façade

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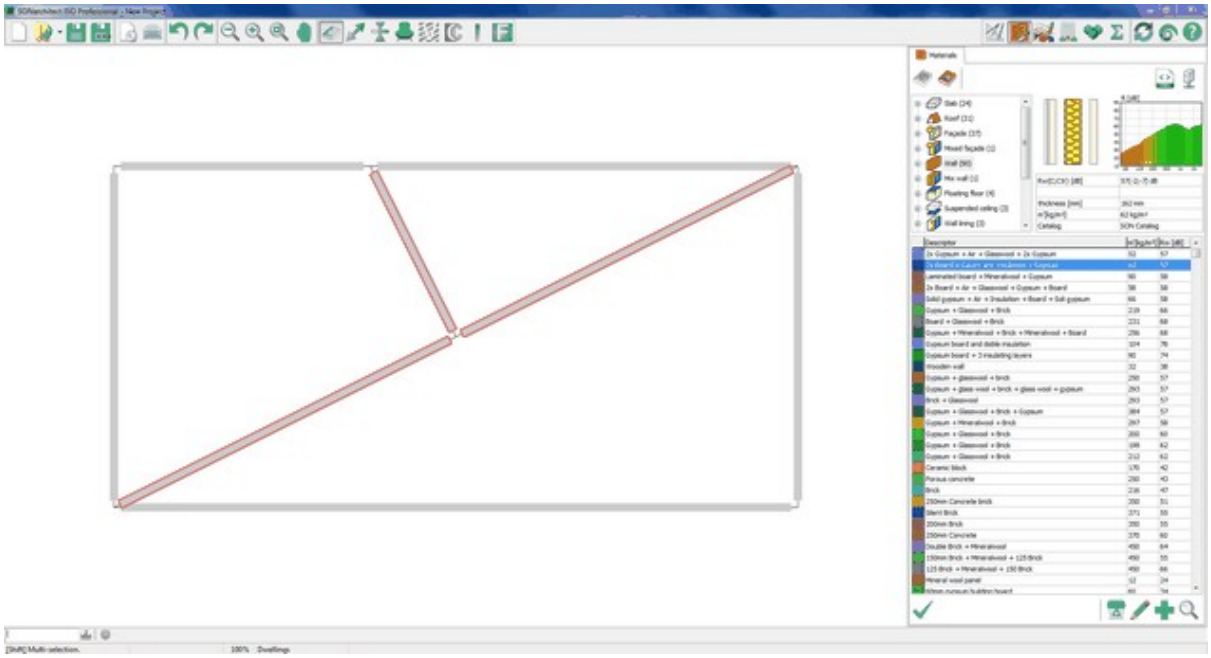
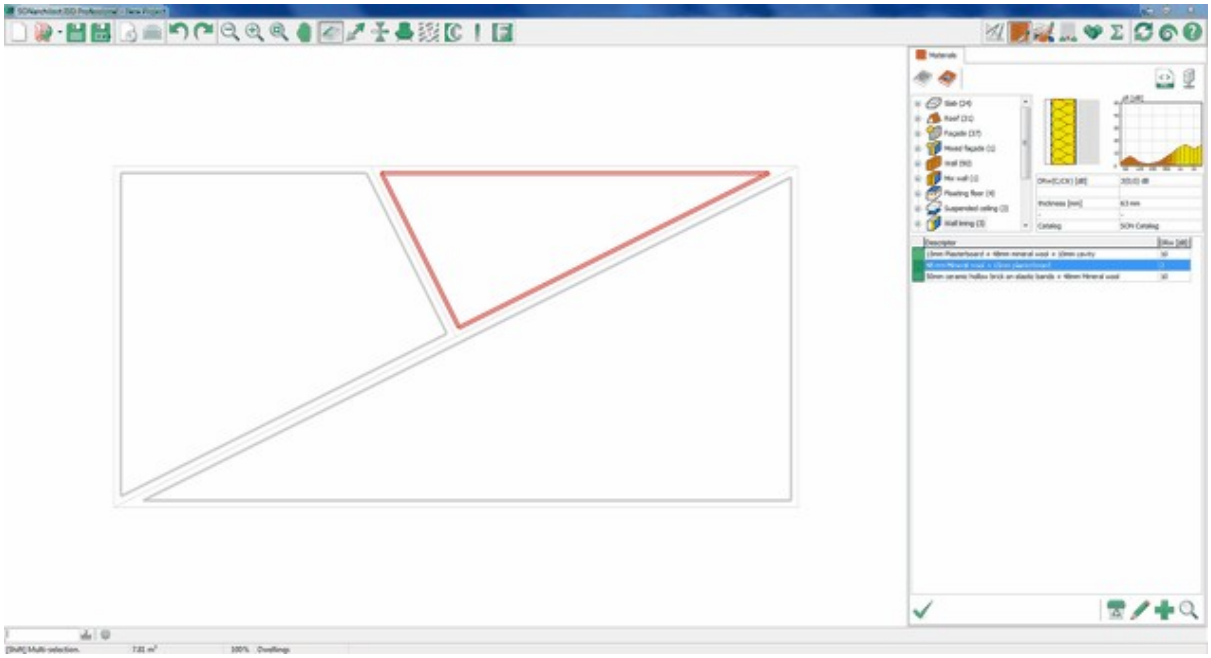


I key - Interior walls



Room selection

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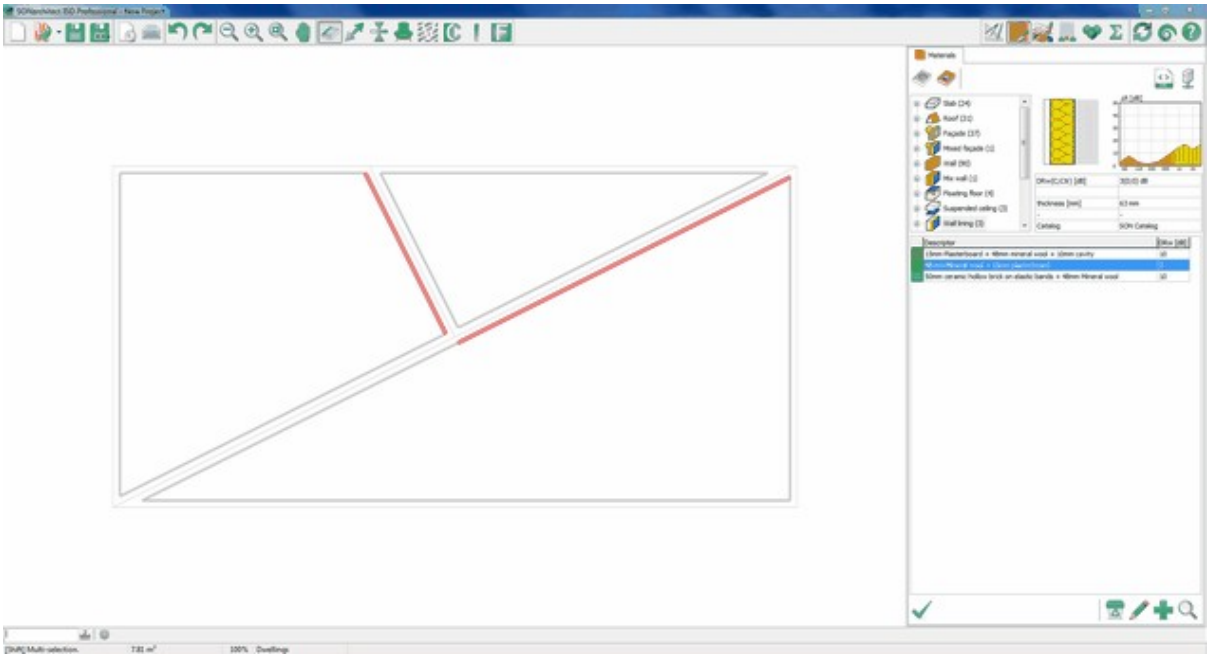

C key - Complementary selection

2.6 Elastic junctions

Junction configuration used to be tedious and confusing in ISO 12354 calculations. But with SONarchitect this is no longer the case. SONarchitect really understands the geometry of your building. It knows whether a junction is T- or X-shaped. It knows the materials meeting at any junction in the building so it knows whether the elements are heavy or light, double or single, massif, light façade, and so on. SONarchitect has, but also understands, all that information and it will make the right choice of the adequate Kij (vibration reduction index) for you.

Regrettably, still a bit is required from the user. SONarchitect currently cannot read you mind, so if you want to use elastic bands in your design you need to tell it where you want them. To solve this, we at SON have devised a really easy-to-use procedure that will save you lots of time, but you have to take a second to understand it. Let us try it in our toy building!

In the Materials mode, select the Wall Junction tool in the toolbar. You will see a change in the drawing representation; some arrows are displayed. There are four arrows per line. Two of them are pointing to the line ends. These mark whether there is, or not, an elastic interface in the extreme of the wall they point to. If the arrow is solid it means that there is an elastic band in that side of the wall, whilst if the arrow is open, it means that no elastic band is inserted, which is the default. The other two arrows, at the center of the line, point upwards and downwards. The upwards arrow marks whether there is an elastic band

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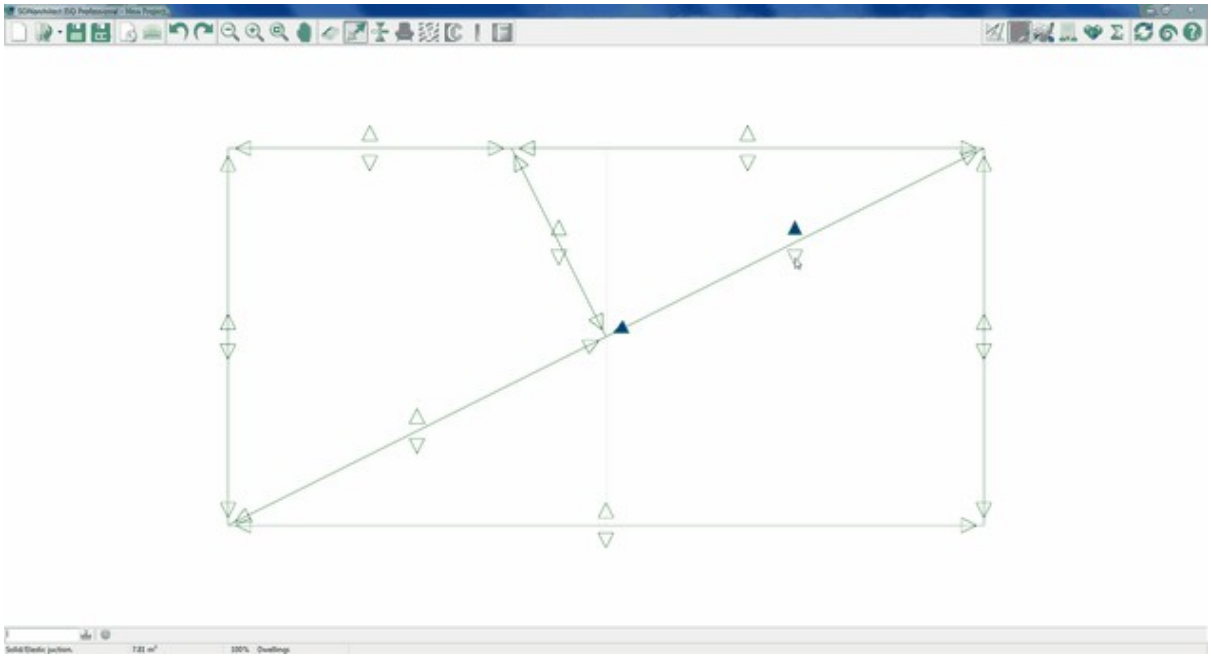
between the wall and the ceiling (hence up), whilst the downwards arrow marks whether there is an elastic band between the wall and the floor (guess what?). To change the arrows state, just click inside them. They will switch between solid and open.

In bigger plans than our toy building you may need to use the mouse wheel to zoom and move around the plan. Note that zooming in is always focused at the cursor, whereas zooming out centers the drawing. Hold CTRL and drag to move the drawing area.



You may also need to insert elastic junctions into the slab, which is of great use to model the dilation joints common in large buildings. To do that, select the Slab Junctions tool . You will see that arrows appear inside the contour of each room, pointing towards it. They mark whether there is, or not, an elastic interface between the slab and the wall they are pointing to. As before, with Wall junctions, solid arrow means that there is an elastic interface, while open means there is not.

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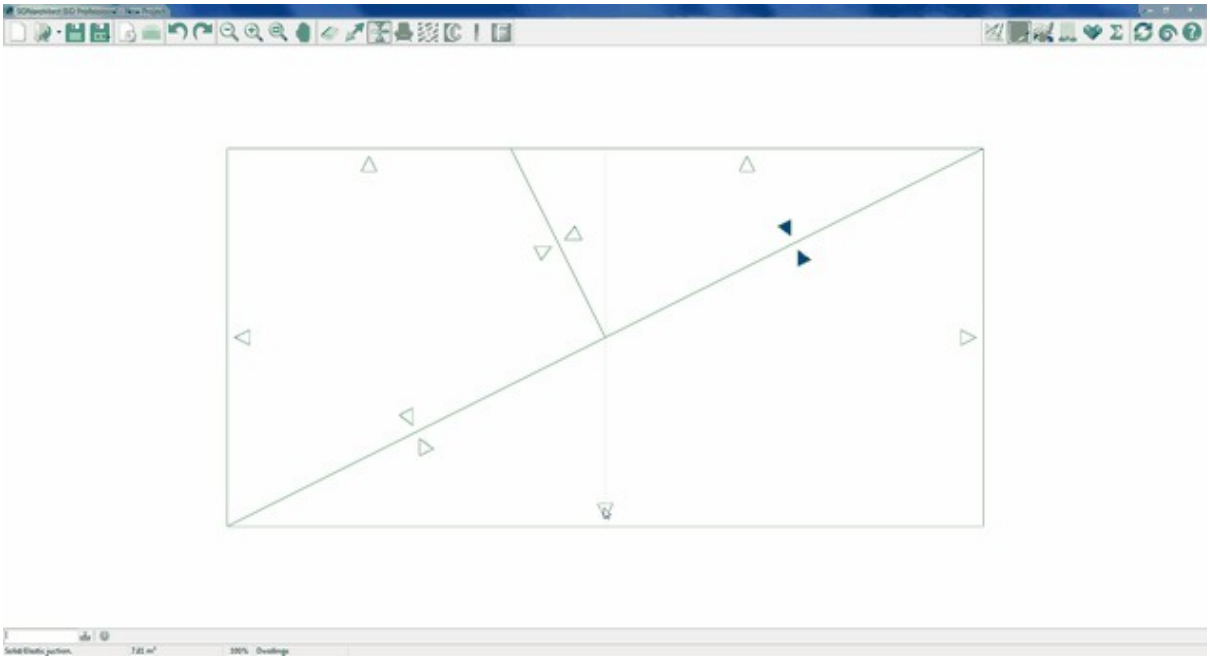
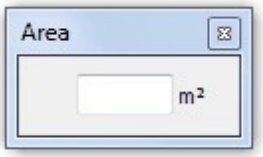


2.7 Windows, doors...

Let us provide some sunlight to the prospective dwellers by adding some windows and doors.

Press again the button in the tool bar, browsing the Window type. Select, for instance, the wall between the bedroom and the stairs. Select Door in the material list, browse the catalog for the door you want, and click or press Enter. A dialog will ask you for the surface area of the door. Of course, you should insert an area which is less than the wall surface area.



A symbolic representation of a door is displayed in the selected wall or walls. The symbol just indicates that there is a door in the wall, not the exact position of the door in the wall, nor its characteristics. For the computation of ISO 12354, the location of the openings in the walls is not relevant. So keep in mind that the doors and windows you can see in the 2D and 3D representations of your buildings are just mere indicators of presence. Do not expect that the 3D view of the façade of your model will look like the real building. SONarchitect is an advanced acoustic computation tool, not a photorealistic 3D renderer. To check the characteristics of any openings in a given wall, you have to select the wall, go to the

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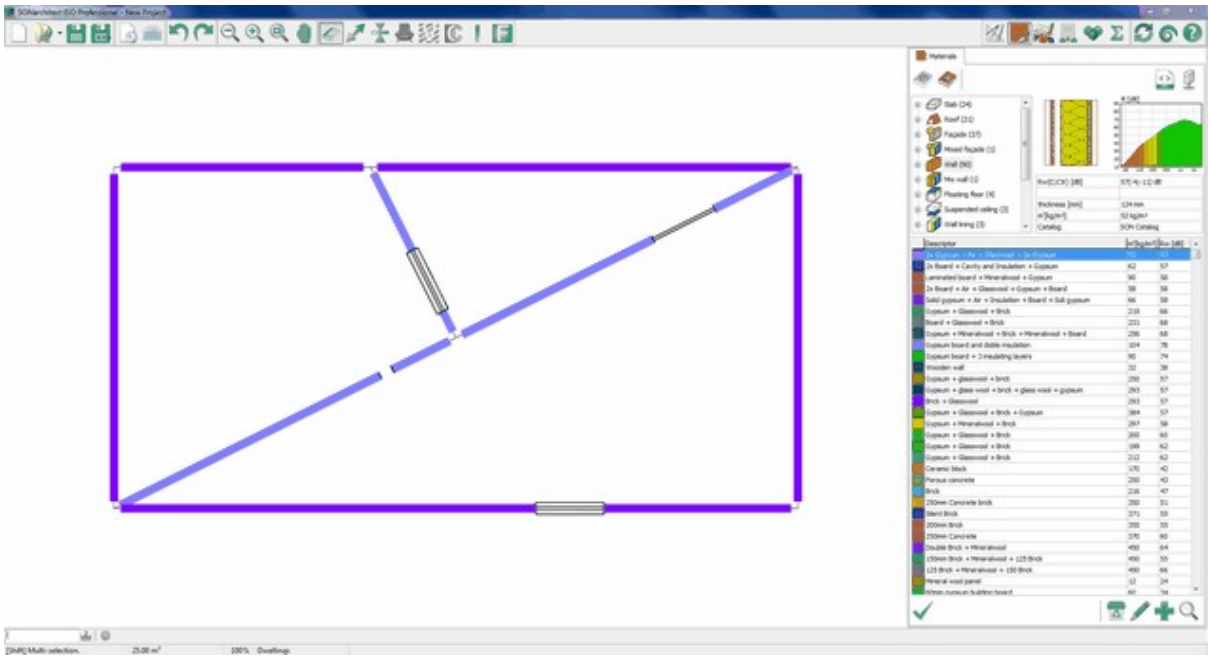
openings tab and inspect the list at the bottom of the panel. There you can also delete any unwanted windows, ducts and doors.

It may be of great convenience to insert a door between Bedroom and Bathroom to get relief in critical moments. Try also to put some windows and ventilation ducts. Notice that you can insert windows in all façade elements in one strike just by selecting all façade elements with the “F” key.



2.8 Let's rock!

Just press and our toy building project would be solved in a fraction of a second.

Let's see all the results in that toy building (requirements have to be configured):

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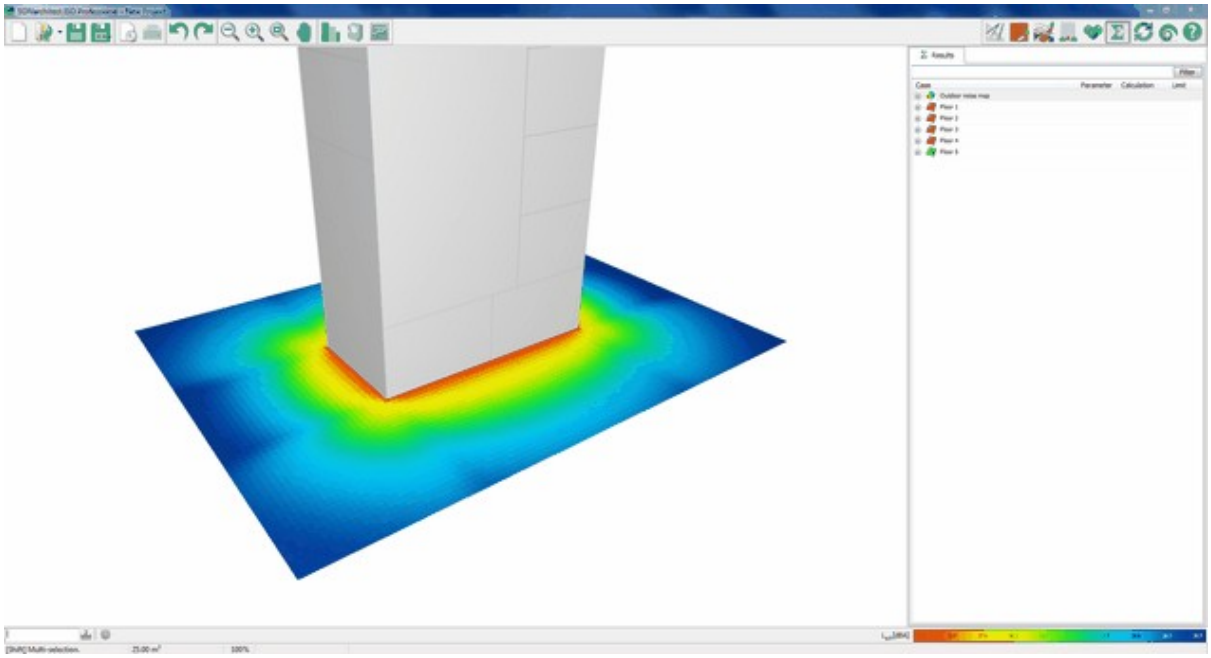

Total building emission

On the left part of the screen a 3D model of the building appears, currently displaying the outdoor noise map calculation as per ISO 12354-4. The tree on the right is the Results Tree. This is no ordinary tree, but a powerful analysis tool. You can browse every detail about the acoustic performance or underperformance of the building, including airborne sound insulation between rooms (ISO 12354-1), impact sound insulation between rooms (ISO 12354-2), airborne sound insulation against outdoor sound (ISO 12354-3), transmission of indoor sound to the outside (ISO 12354-4), and sound absorption in enclosed spaces (ISO 12354-6).

At first, SONarchitect displays the outdoor noise map, which appears at the top of the tree, resulting from the sound transmission of all rooms defined as noisy enclosures in the Project Configuration Form, where you can change the indoor noise level of any room and the requirements. You can browse the individual contributions of every room and separator by clicking the results tree. When an element contribution is clicked, the equivalent acoustic power of the element L_W[dB] is displayed in the bar graph below the Results Tree.

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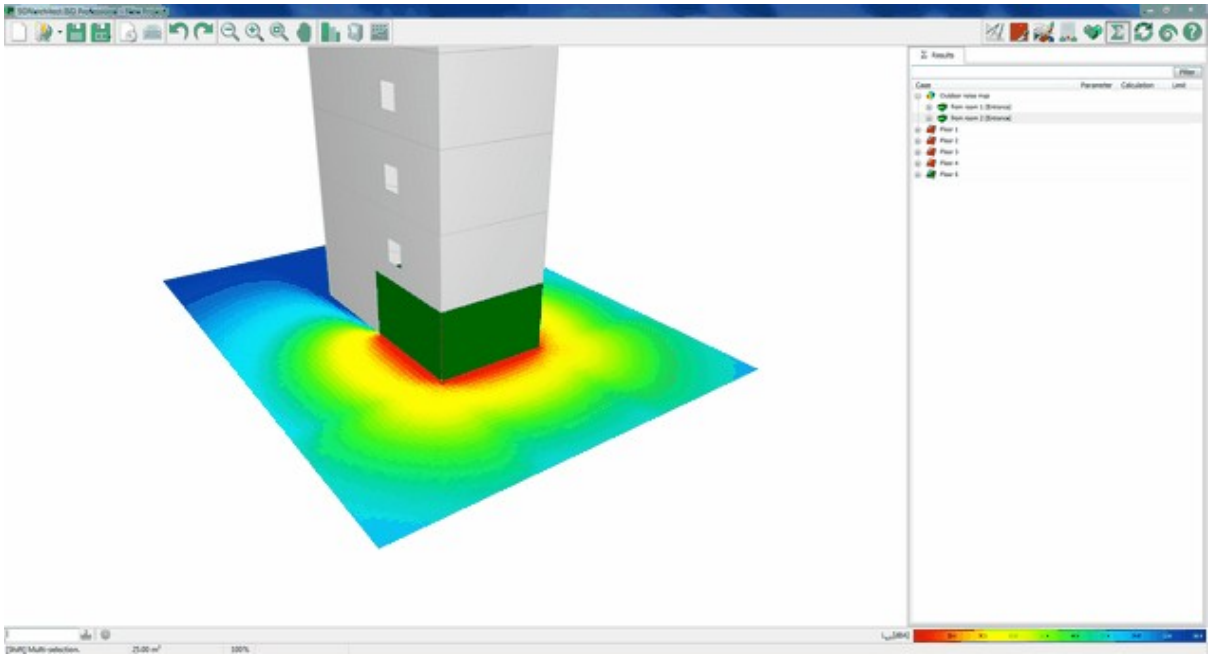
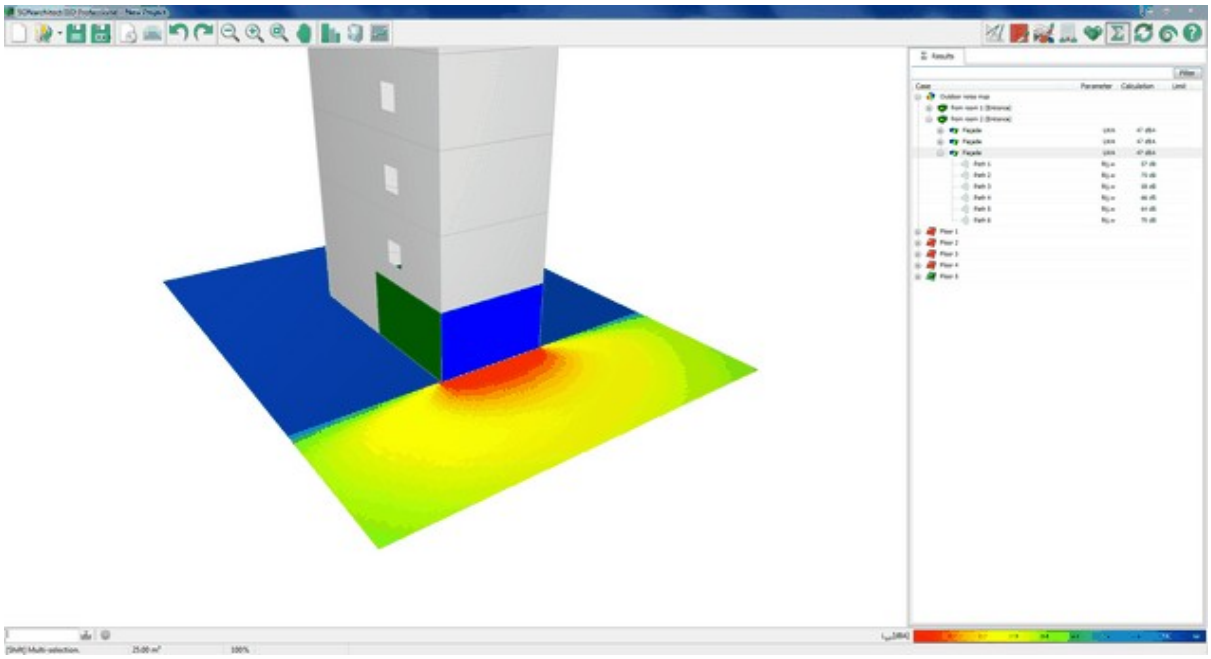


Room emission



Wall emission

Now click the Floor nodes in the Results Tree (let's take a bigger real building, so we can show you all the different topologies clearer).

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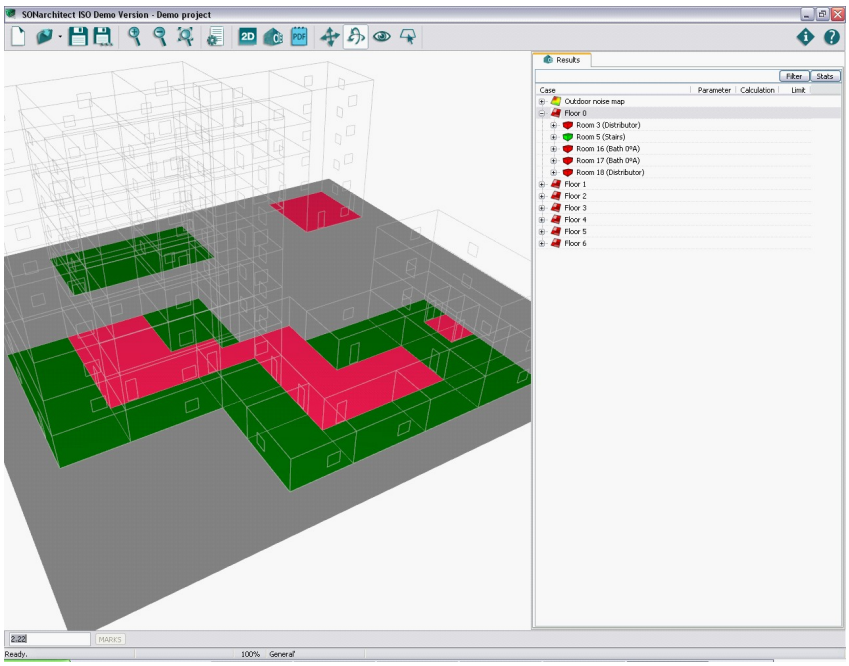
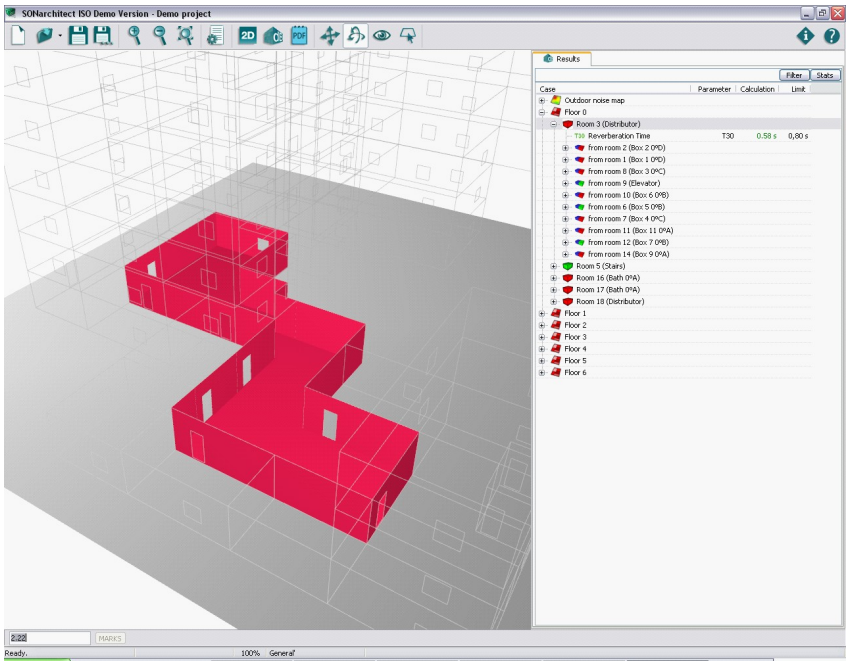


All rooms in floor 0 are displayed. The horizontal elements of the floor are shown in red or green. Rooms in green meet all the requirements, while rooms in red fail one or more requirements. The requirements are configured in the Project Configuration Form, with different requirements depending on the uses of the receiving and transmitting rooms.

Let us click the first room displayed under floor 0, which is Room 3 (Distributor), “Distributor” being the identifier chosen for the room by the designer.



The distributor is displayed. Here you have a good example of the kind of arbitrary

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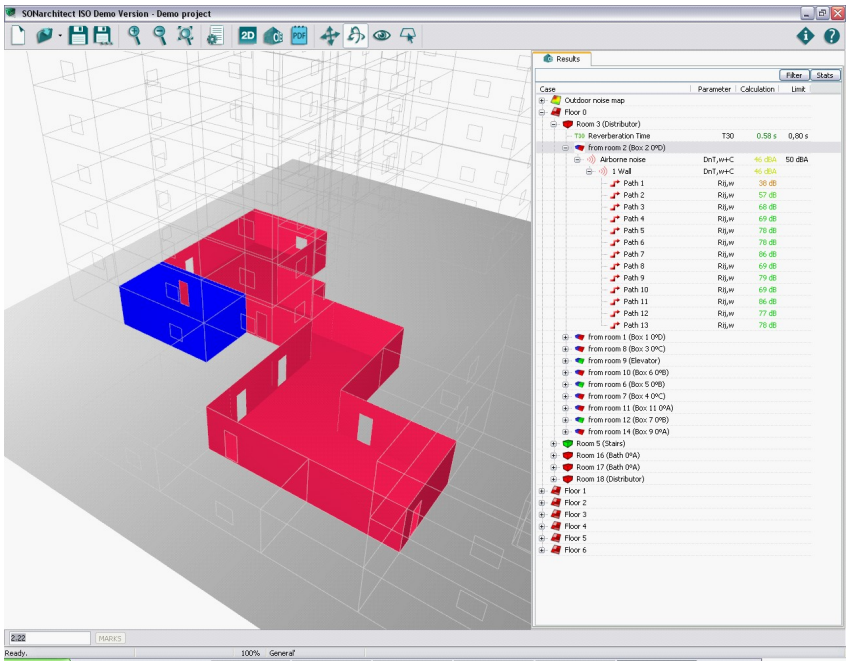
geometries that SONarchitect tackles with ease. Notice that it is red, as it does not meet several requirements. If the Distributor node in the Result Tree is unfolded, all the calculation results can be seen according to the different requirements. First appears the reverberation time requirement; you can click it to see the reverberation time with frequency in the bar graphs.

Further down there is a set of nodes with the insulation results from rooms adjacent to the distributor. Click on node “from room 2 (Box 2 0ºD)” and expand it.



Now you are displaying the acoustic insulation between Box 2 (the transmitting room, always in blue) and the distributor (receiving room, red or green). By browsing through the child nodes you can inspect every transmission path between the rooms. At first glance a transmission path in red stands out. This is the result that SONarchitect has determined to be the dominant transmission path. Click it.

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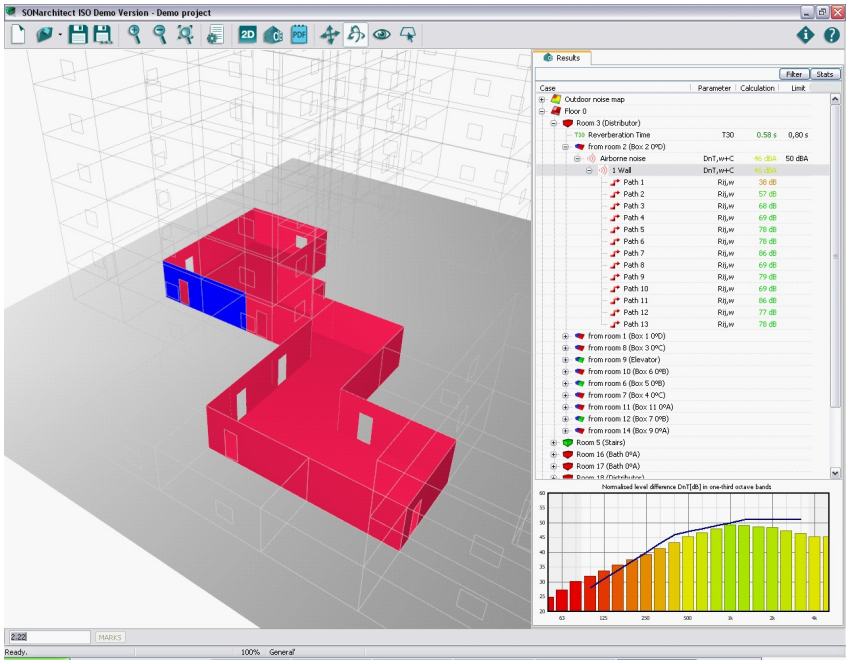

SONarchitect plots the Normalized Levels Difference DnT [dB] in the bar graph. It shows a quite low airborne insulation for the lower frequencies. The 3D model shows the transmission path. By the representation it becomes evident that it corresponds to the direct transmission, and that the sound insulation problem is due to the door, which presents a fair low sound insulation.

To experience another example of complex geometry just browse till “Floor 2” > “Room 30 (Common Area)” > “from room 9 (elevator)”.

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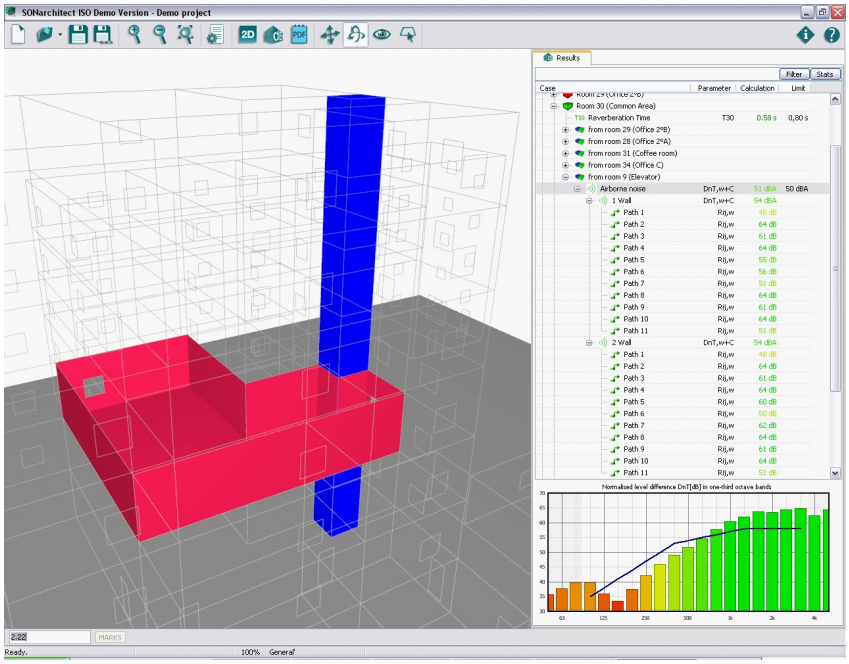
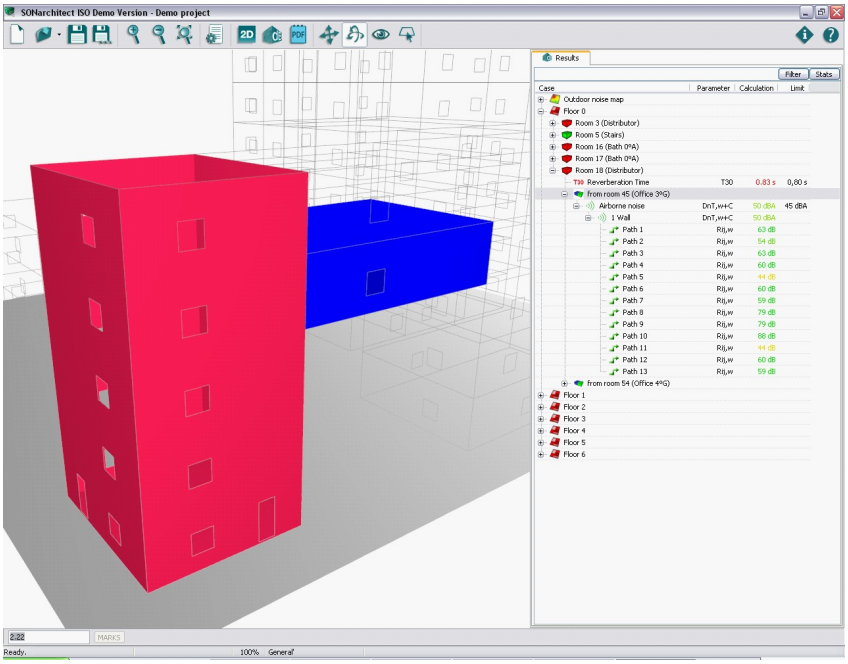


There you will see how slab virtualization allows SONarchitect to deal with multiple floor rooms, and to rightly compute all the flanking transmission paths between rooms. You will also see another interesting example in “Floor 0” > “Room 18 (Distributor)” > “Room 45 (Office 3ºG)”



Inspect the transmission paths to experience how SONarchitect really understands the building geometry.

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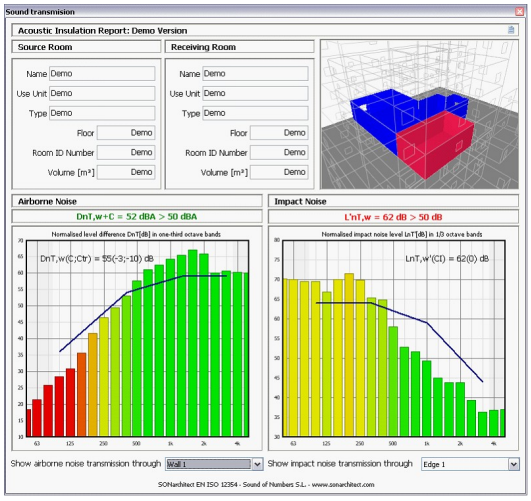
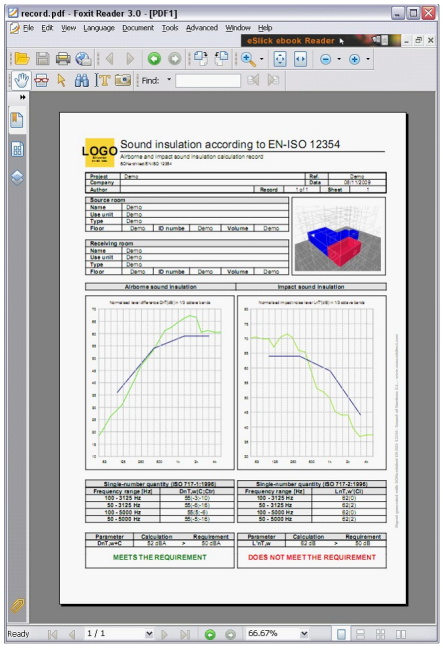
Let us go forth. Browse for the "Floor 3" > "Room 38 (Office 3ºB)" > "from room 39". Double click node "from room 39", and a summary of the acoustic insulation will be displayed showing the airborne and impact sound insulation between the rooms.



Notice that some information is missing in the Demo version (all in all it is a demo, isn't it?). It goes without saying that a full license entitles you to have all fields full of insightful information. If you click the tiny file icon in the top right corner of the summary, a PDF file will be generated with a record of all the needed information related to the acoustic insulation between the room.


record.pdf - Foxit Reader 3.0 - [PDF1]
Sound insulation according to EN-ISO 12354
LOGO
MEETS THE REQUIREMENT
DOES NOT MEET THE REQUIREMENT

By double clicking node "Wall 1" (or by selecting it in the summary combo box) an airborne sound insulation summary will appear. The same occurs with the "Slab 1" and the impact sound insulation.

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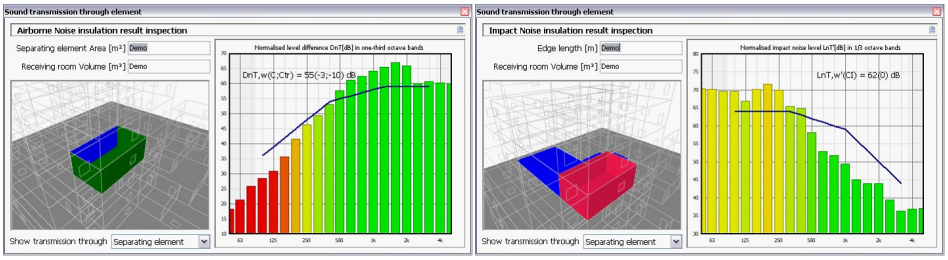
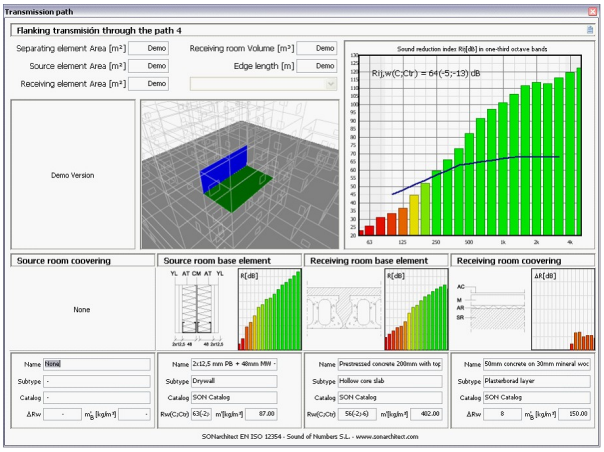

Sound transmission through element
Airborne Noise insulation result inspection
Separating element Area [m²] Demo
Receiving room Volume [m³] Demo
Normalised level difference DnT[dB] in one-third octave bands
DnT,w(C;Ctr) = 55(-3;-10) dB
Show transmission through Separating element
Sound transmission through element
Impact Noise insulation result inspection
Edge length [m] Demo
Receiving room Volume [m³] Demo
Normalised impact noise level LnT[dB] in 1/3 octave bands
LnT,w'(CI) = 62(0) dB
Show transmission through Separating element

You can always click the tiny file icon in the top right corner to generate a PDF document of the specific result.

Finally, if you double click one of the transmission path nodes, a report of the specific transmission path will be displayed, with information about the materials of the flanking elements.


Transmission path
Flanking transmisión through the path 4
Separating element Area [m²] Demo
Source element Area [m²] Demo
Receiving element Area [m²] Demo
Receiving room Volume [m³] Demo
Edge length [m] Demo
Sound reduction index Rij[dB] in one-third octave bands
Rij,w(C;Ctr) = 64(-5;-13) dB
Demo Version
Source room coovering
None
Source room base element
Receiving room base element
Receiving room coovering
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Again some information is missing in the Demo version and PDF generation is not allowed. Do not you feel as wanting a license? Call us!

With the licensed version, if you are not satisfied with the results, you just go back to 2D, and change the design, materials, junctions, or uses as many times and as far as you want. Then, in a matter of seconds, you will get the new results. This iterative process, unfeasible with most of applications, is fast and easy with SONarchitect, increasing your productivity and allowing you to optimize your designs in practical time.

2.9 Histograms?

SONarchitect can compute the whole building acoustic performance in a matter of seconds, and it allows you to see and browse the results in an intuitive and comfortable way, letting you to improve and optimize the acoustic design of your projects. But, can it do even more?

In Sound Of Numbers we love numbers, and statistics is a smart way of dealing with numbers. In fact, the whole ISO 12354 computation process comes from Statistical Energy

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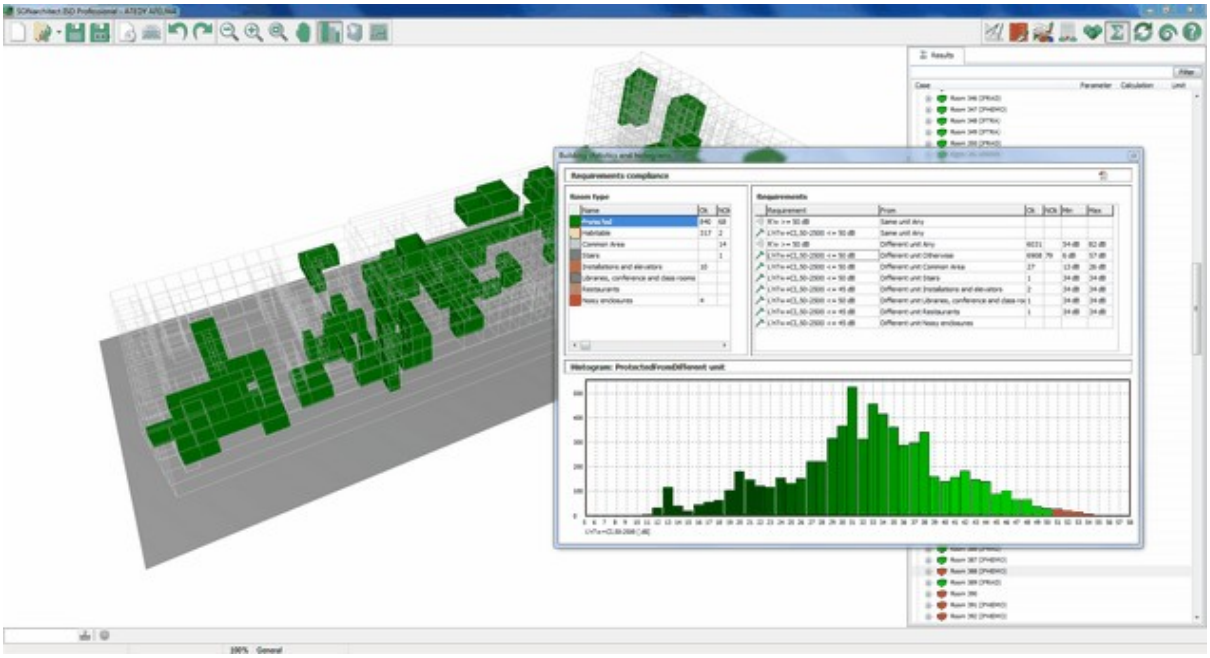
Analysis. What about performing statistics with the statistics? What if we compute the statistics of the acoustic insulation of the entire building? Could we estimate the probability distribution of the acoustic insulation?

Yes, we can. You can see the statistics of your building just by pressing in the Results toolbar.

The matrix shows every combination of pairings of types of rooms in the building. Clicking any matrix cell will show the corresponding histogram of acoustic insulation results. Furthermore, you can click any histogram bar and all rooms within the corresponding levels will appear in the 3D view. Thus you can localize and also visually inspect the set of the worst/best/average/in-between performing rooms quickly and easily.

But let us show some of the histograms of real-sized building projects with over 30,000 calculation results.



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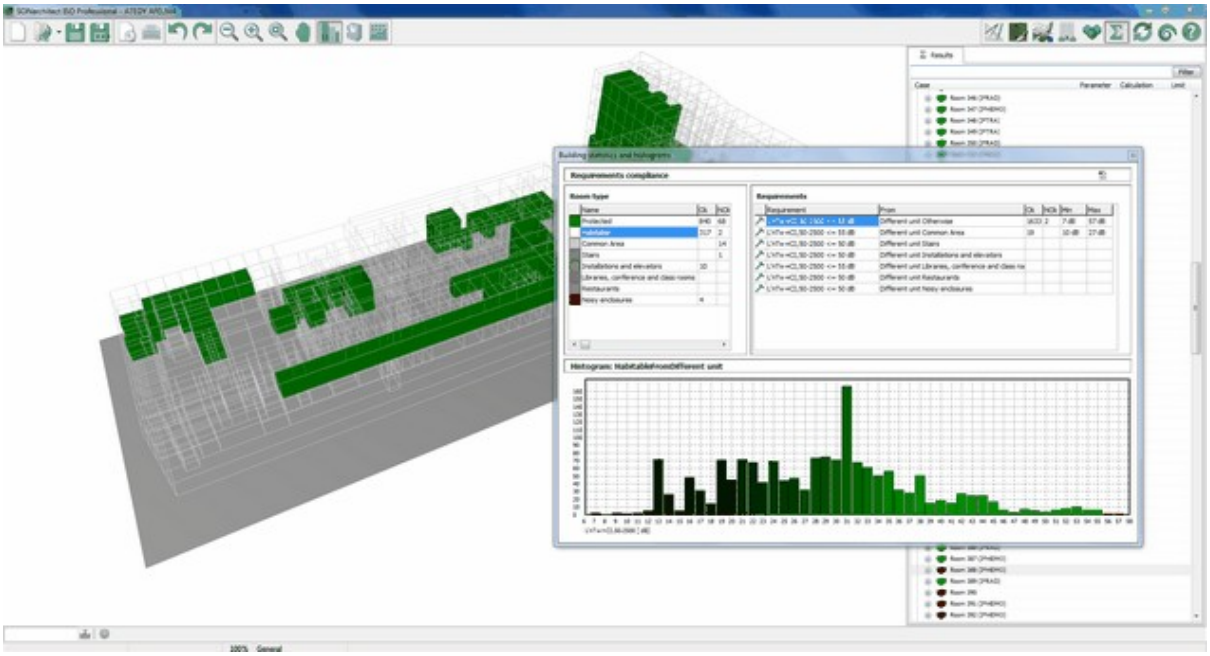

2.10 To report or not to report!

With SONarchitect Professional, you can print a PDF file with all the results in the Result Tree just by pressing the Report button in the results toolbar. You can configure the sections you want to include in your report, select the acoustic records of interest, or let SONarchitect to chose the critical results for you. To justify the complete acoustic performance of an entire building to your local government or administration, you do not need to deliver all the records of your building. For large buildings as the displayed above, this would result in reports well over 30,000 pages long!!.

To justify the compliance of an entire building it is enough to report the worst case records, and the information proving that the records you are delivering are, precisely, the worst. And that can be easily done through the histogram. Just by including the building histogram, a record is shown to be the worst case for a given configuration if it belongs to the extreme bar in the histogram. At the same time, the histogram also shows the overall acoustic performance of the building, beyond the insulation level of the worst cases. So, luckily, reports can be kept about 20-30 pages long!

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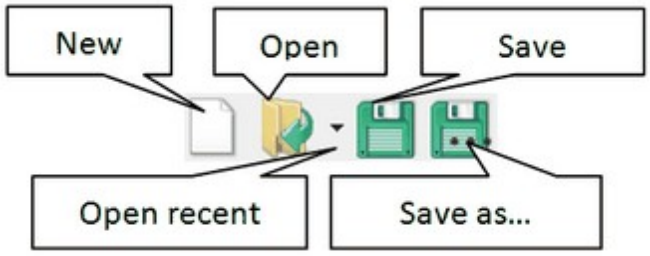
Chapter III

File

3 File

After starting SONarchitect, you can open a previous project or start a new one. In the toolbar you have the New and Open buttons.



SONarchitect ISO file type is *.SDW

3.1 New

Pressing the New button on the toolbar, you start a new project.

The dialog "Project Properties" allows you to enter information necessary to start with your project.

On the first tab, "Project", SONarchitect asks you to enter information identifying the project and the name or reference. Both the Software licence owner and the organization are given by your license SONarchitect.

In case someone else in your company is using SONarchitect you can specify an Author name.

Insert a Project title and a reference that will be included in the PDF report. Also the Author name and the Organisation will be included.

You may optionally define an initial drawing area, by specifying the X and Y spans in meters, to better adapt the drawing area to your project since the beginning. In any case, the drawing area will be automatically adapted to your drawing anytime you save your project, and it grows on demand while you draw.

Now you have four considerations for the calculations:

- Consider different unit for rooms on different floors: If you check this point adjacent rooms located in different floors will be considered as different units. See requirements section.
- Do not compute outdoor map: Disables the visualization of the outdoor noise map.

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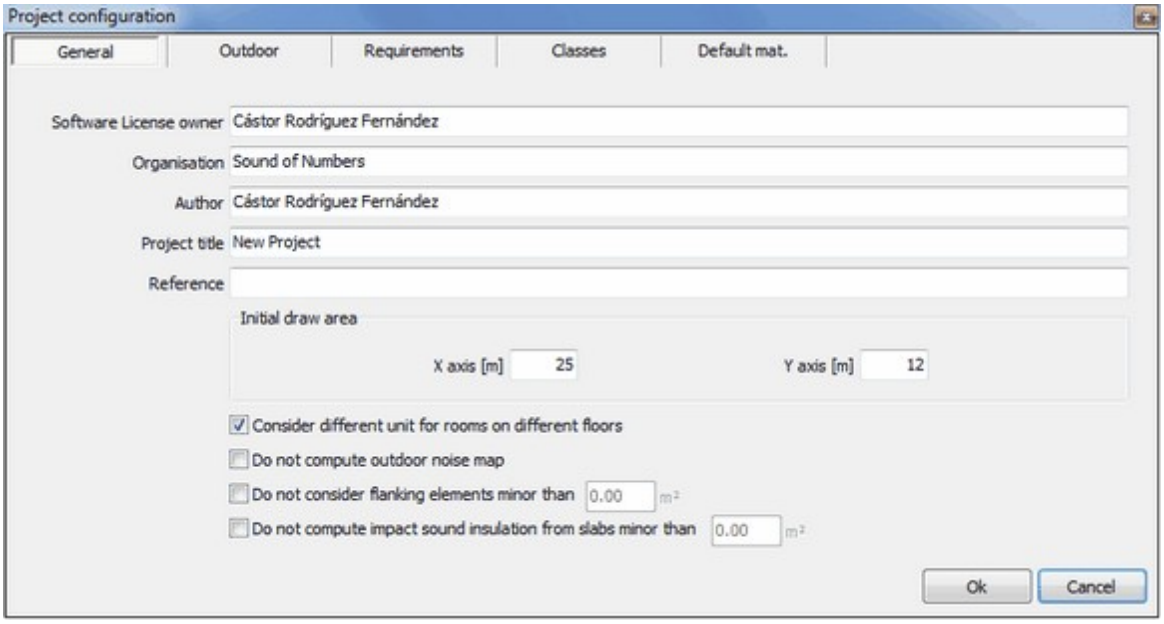
- Do not consider flanking elements minor than X m: Very small flanking elements can over estimate the sound insulation between two rooms according to EN ISO 12354. The engineer can decide the area of the smallest flanking elements to appear in the calculations.
- Do not compute impact sound insulation from slabs minor than X m: The method of the EN ISO 12354 might under estimate impact sound insulation for very small slabs. You can limit the calculation for avoiding small slabs impact sound insulation in the results.



You can edit the data in the "Project Properties" dialog at any time by clicking the Properties button .

There are 4 other tabs for entering data:

3.1.1 Outdoor noise

Data related to environmental incident noise levels outside the building:

Diurnal noise index of the most exposed façade as reflected in the map of environmental noise. Failing that, but having a zoning of environmental sound, you must specify the acoustic area type.

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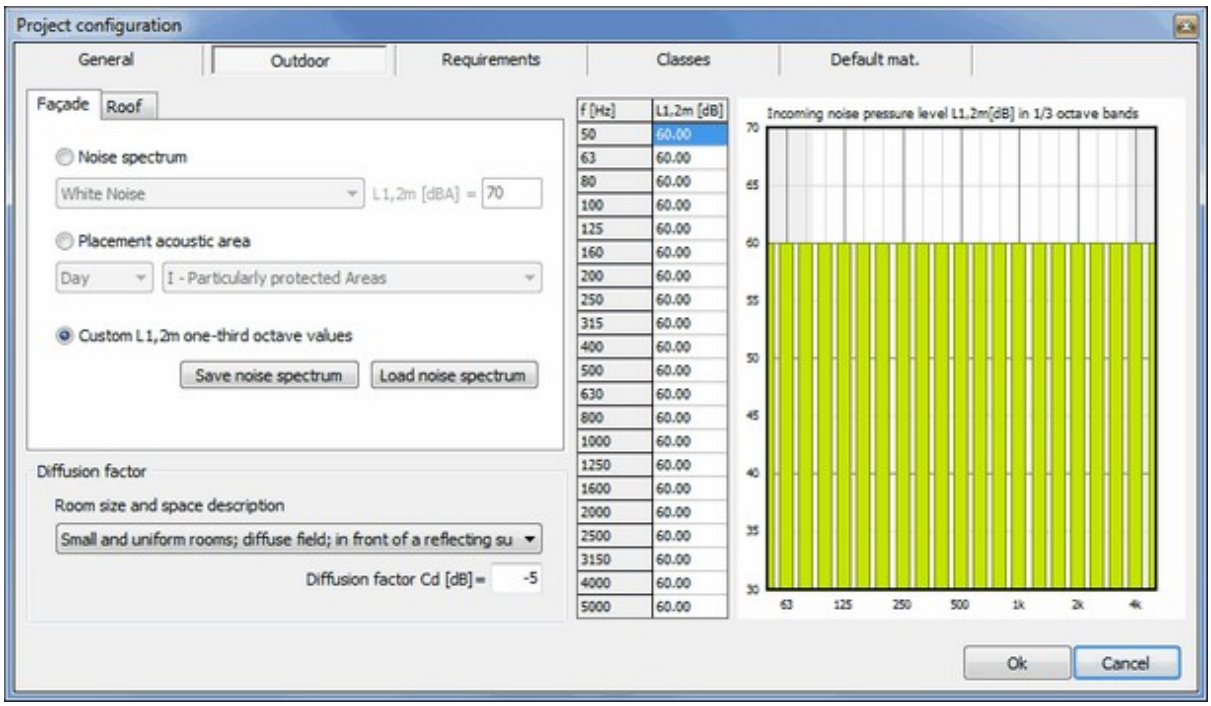

Outdoor noise

So, you can choose the default incident outdoor noise levels by choosing among these three options:

- Predefined spectrum shape noise: White, Pink or Brown. Define the level L1,2m [dBA].

- The level according to the placement area.

- A custom level, defined by the user just inserting the one-third octave values. You can save or load a custom level in one third octave. The file is a *.sns (SONarchitect Noise Spectrum)

In addition, specify the noise index Ld for roofs in the Roof tab next to the Façade tab, in the same way than the Façade incident noise but it also allows the disabling for calculating airborne noise in roofs.

You can also choose the **diffusion factor**: According to the UNE 12354-4, Cd is defined as the level difference between the acoustic pressure level in a point, 1 or 2 m away from the the interior face of the façade, and the intensity level that comes perpendiculary into contact with that element. It is influenced by the diffusion of the sound field inside the room and the absorption of the interior of the façade segment. Those 5 options you have in SONarchitect are contained in the Annex B of the 12354-4.

3.1.2 Requirements

SONarchitect ISO follows the ISO EN 12354, with no specific legislation directives. You can

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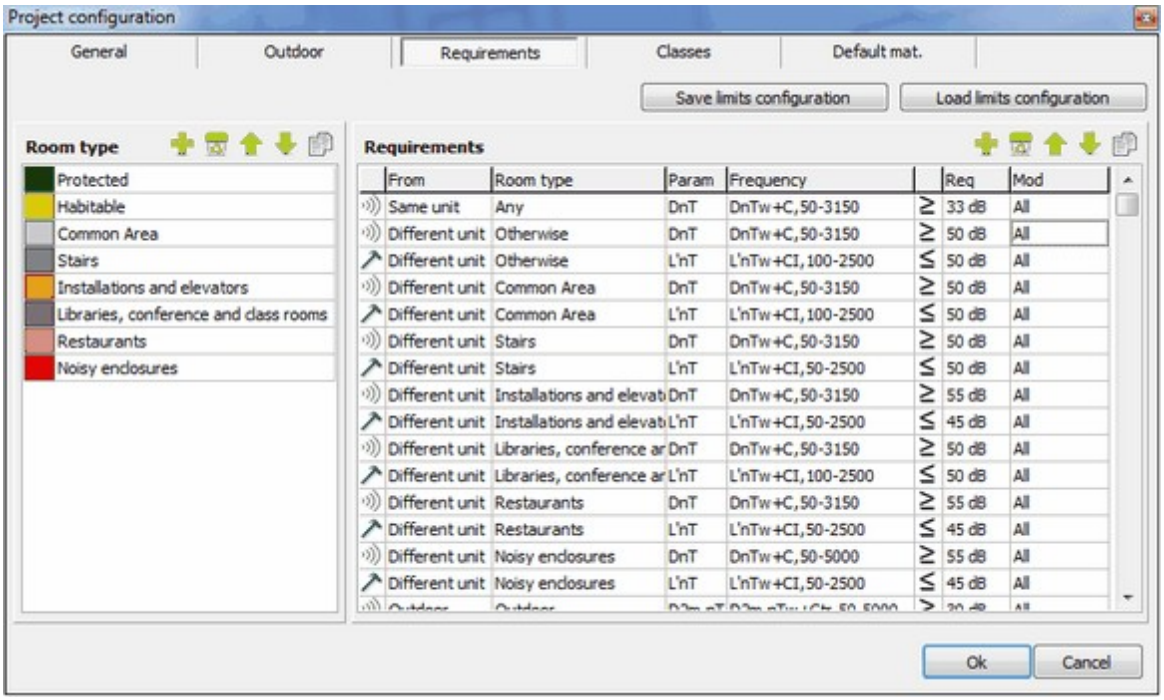
establish and customize limits for acoustic insulation according to any specific local Building Code or your quality criteria.

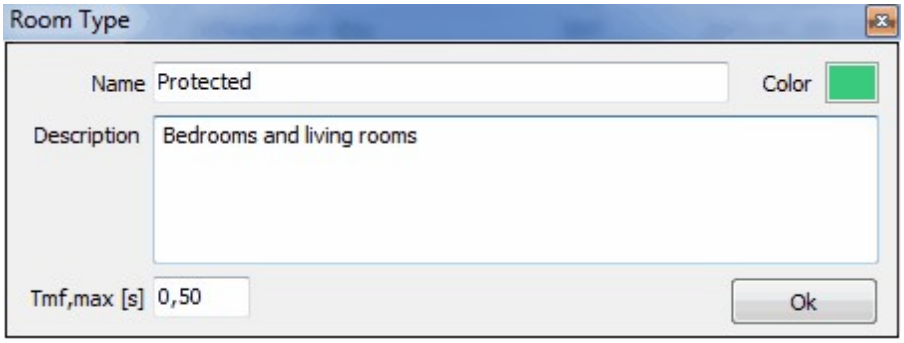
Just input the limits depending on the type of rooms, and SONarchitect ISO will threshold the results according to those limits. You can save or load this configuration from a specific file.


Project configuration
General
Outdoor
Requirements
Classes
Default mat.
Save limits configuration
Load limits configuration
Room type
Protected
Habitable
Common Area
Stairs
Installations and elevators
Libraries, conference and class rooms
Restaurants
Noisy enclosures
Requirements
From
Room type
Param
Frequency
Req
Mod
Same unit Any DnT DnTw+C,50-3150 ≥ 33 dB All
Different unit Otherwise DnT DnTw+C,50-3150 ≥ 50 dB All
Different unit Otherwise L'nT L'nTw+CI,100-2500 ≤ 50 dB All
Different unit Common Area DnT DnTw+C,50-3150 ≥ 50 dB All
Different unit Common Area L'nT L'nTw+CI,100-2500 ≤ 50 dB All
Different unit Stairs DnT DnTw+C,50-3150 ≥ 50 dB All
Different unit Stairs L'nT L'nTw+CI,50-2500 ≤ 50 dB All
Different unit Installations and elevati DnT DnTw+C,50-3150 ≥ 55 dB All
Different unit Installations and elevati L'nT L'nTw+CI,50-2500 ≤ 45 dB All
Different unit Libraries, conference ar DnT DnTw+C,50-3150 ≥ 50 dB All
Different unit Libraries, conference ar L'nT L'nTw+CI,100-2500 ≤ 50 dB All
Different unit Restaurants DnT DnTw+C,50-3150 ≥ 55 dB All
Different unit Restaurants L'nT L'nTw+CI,50-2500 ≤ 45 dB All
Different unit Noisy enclosures DnT DnTw+C,50-5000 ≥ 55 dB All
Different unit Noisy enclosures L'nT L'nTw+CI,50-2500 ≤ 45 dB All
Ok
Cancel

Requirements creation

You must create as many room types as you need, erase, move or copy with the managing tools: .

Double click the room type and you must also choose a color for every room type in order to identify them in the plan. Change the name of the room type double click on the name and add a brief description. You can assign a Medium Reverberation Time Tm,f to that room also in that dialog.



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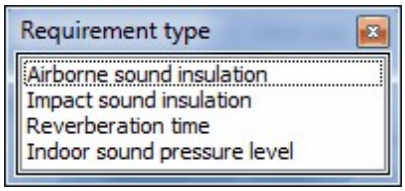
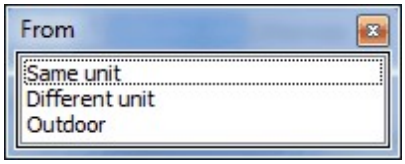
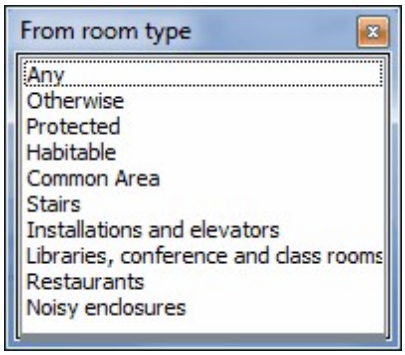
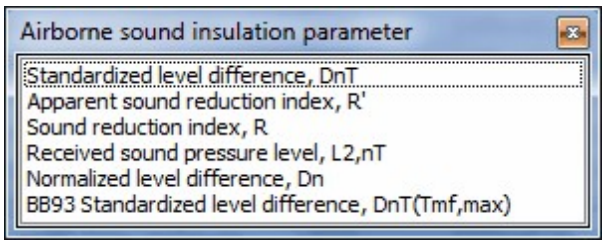
For each room you can add as many requirements as you might need (a row per requirement). Manage them with the same tools (create, erase, move and copy). Double click in each column for editing it.

The first column indicates the requirement type	
From column specifies whether the adjacent enclosure is in the same unit or in a different one. Select outdoor if the requirement is for façades and roofs.	
Room type column identifies the type of the adjacent room for the requirement. The window displays all the room types you have created, all other types selection with no speficications "Otherwise", or even any adjacent room type with "Any"	
Param column selects the acoustic parameters for the calculation for every type of requirement.	

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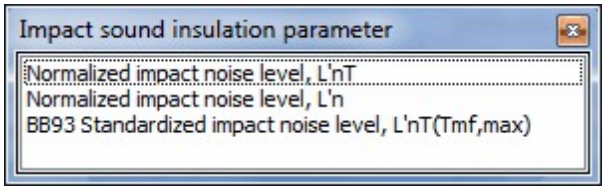
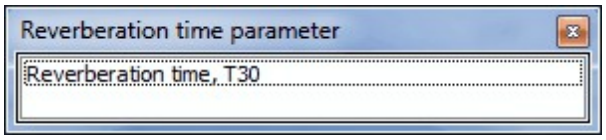
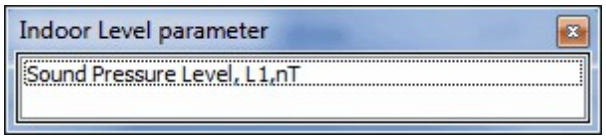
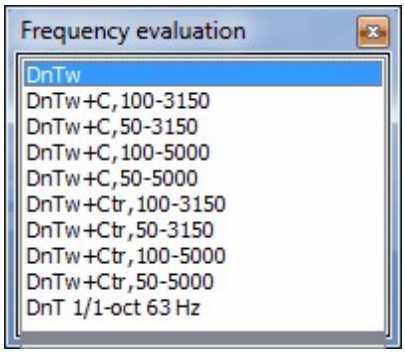
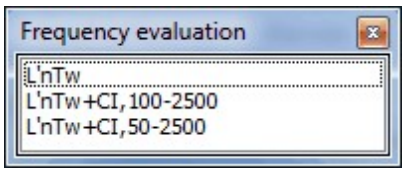
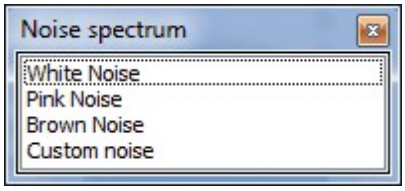
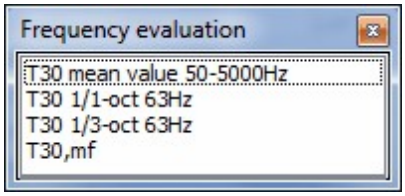
<table>
<tr>
<td></td>
<td>

Impact sound insulation parameter
Normalized impact noise level, L'nT
Normalized impact noise level, L'n
BB93 Standardized impact noise level, L'nT(Tmf,max)




</td>
</tr>
<tr>
<td>Frequency column contains the evaluation of the frequency domain depending on the type of requirement.</td>
<td>






In Custom noise, you can load a *.sns file with the spectrum data. This file can be created in the Outdoor noise tab.


</td>
</tr>
</table>

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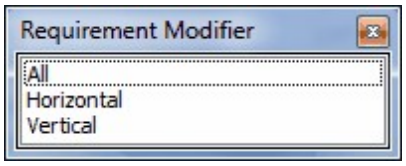
The sixth column displays the comparison operator for each type of requirement.	= For airborne noise insulation. = For impact noise insulation and reverberation time = For Level indoor noise
Threshold value	
Modifier: Choose the direction of the calculation (horizontal, vertical or both)	

3.1.3 Classification schemes

SONarchitect has included nine schemes of acoustic quality classification. Choose the country and you will assign the range values for airborne and impact sound insulation between different units and within the same dwelling.

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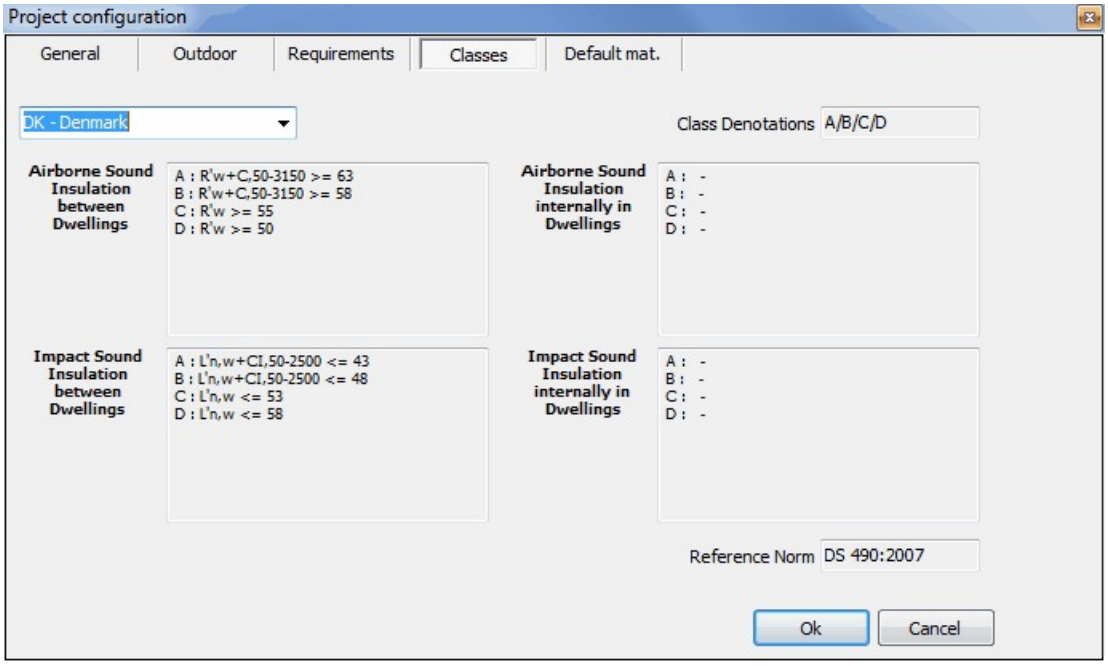

Schemes dialog

Once you have selected the scheme, the PDF report will contain the classification statement.

3.1.4 Default materials

As most projects use mainly a small subset of building solutions, you can define some to be assigned by default as you draw.

You can specify default solutions for:

- Slabs
- Walls
- Wall lining
- Roofs
- Floating floors
- Suspended ceilings
- Ceiling absorption
- Wall absorption
- Floor absorption

Just click the button to the right of each category , thus accessing the SONarchitect catalog of constructive elements:

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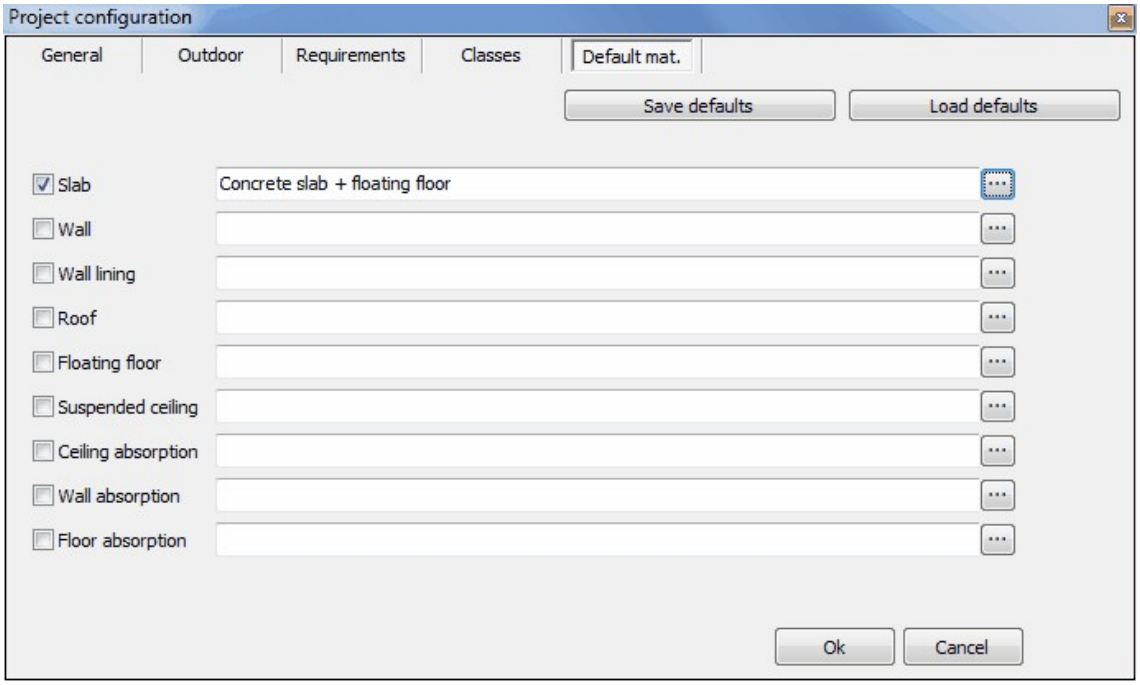

Default materials

You may Save the starting preferences to use them in other projects.

3.2 Save

The SONarchitect ISO file extension is *. sdw. The file with the desired name is created using the tool Save or Save As ... .

Auto saving

For your security, SONarchitect has an auto saving feature by which your project is automatically saved at regular intervals with extension .bup. If you want to access the contents of a backup file, for instance in case of a hardware crash, simply change the extension to .sdw. Additionally, the user can always use the tool Save As .. to make a copy of the current project to another file. We recommend that you use a sequential numbering of filenames for your more complex projects, so you can always go back to an earlier stage of your project in case you encounter any problems during the development of your project.

3.3 Export to Odeon

SONarchitect ISO is connected to the room acoustics software Odeon. Press Save as.. button as and choose Odeon Parametric File (*.Par) among the Type of files.

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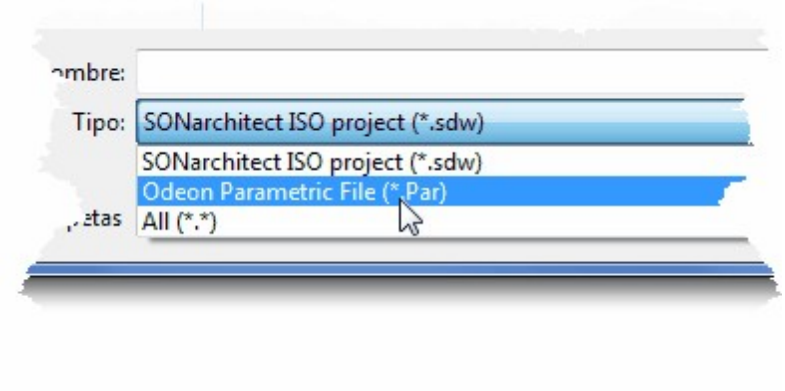

Then you will be able to load the SONarchitect ISO 3D model of the building in Odeon.

3.4 Open

With the Open button you can load an SDW file.

For better accessibility, the arrow on the right displays a list of recent projects.

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Chapter IV

Program settings

4 Program settings

SONarchitect computes sound insulation according to EN ISO 12354. It must be fed with some user data:

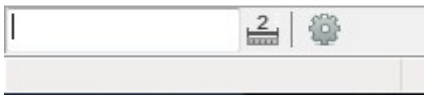
- Geometry
- Materials
- Uses
- Atmospheric conditions

The geometry is input in the drawing stage but the user can configure SONarchitect where the materials, uses and atmospheric conditions come from. This will be the default configuration.

In addition, you will have your SONarchitect licence always up to date using the Updates application.

4.1 Options

Click the Program Settings button (little button near the status bar).



- When you have previously created your limits, load a *.lim file that may contain your desired requirements:

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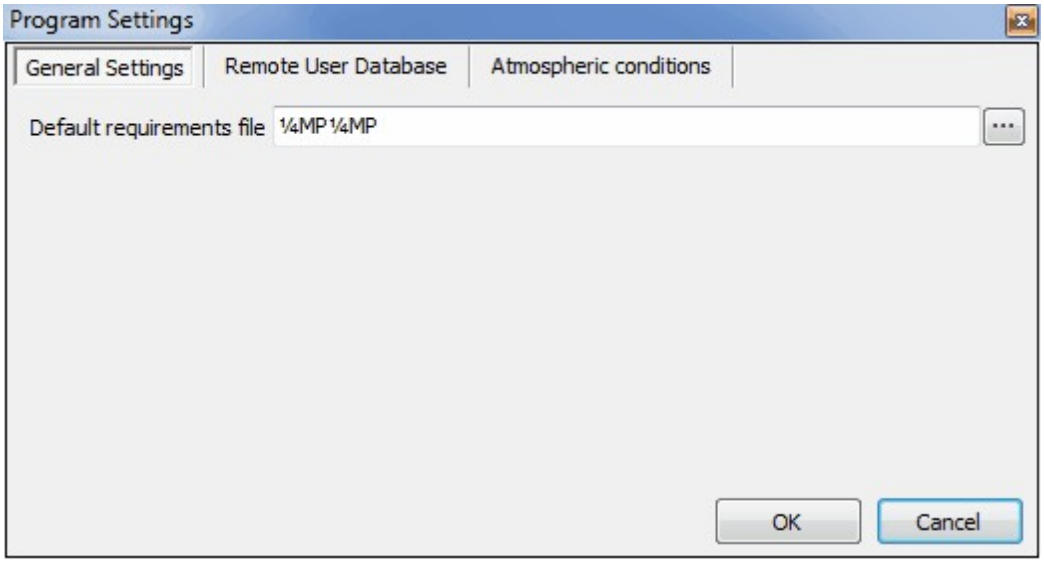
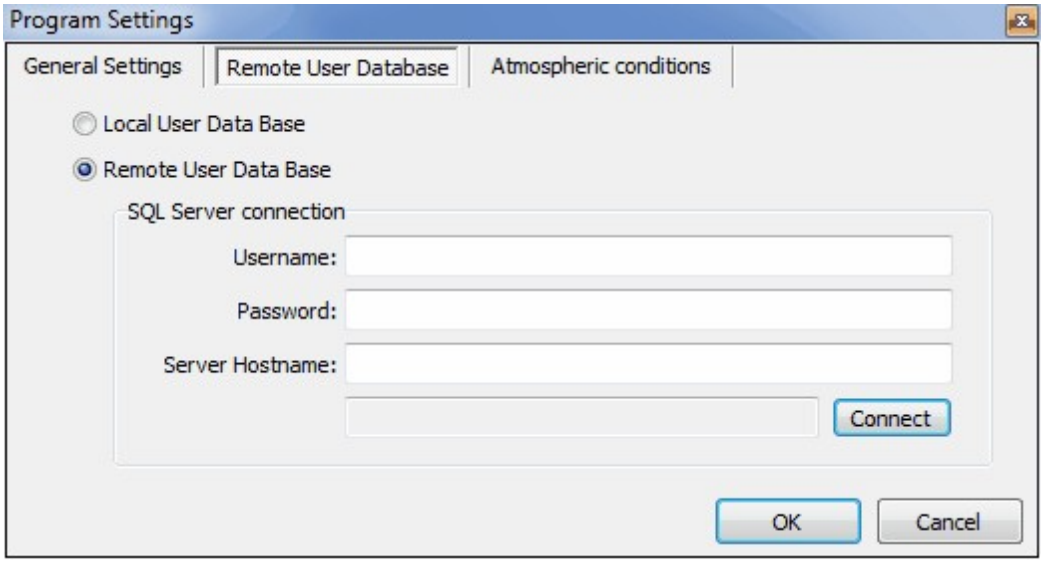


Load requirements file

- Decide where the database is located. Choose whether the database is a Local User Data Base or it belongs to a SQL server. Just enter the connection data for accessing the Remote SQL Data Base and click *Connect*. See the SQL Server Quick Install Guide.



Database locator

- Specify the atmospheric conditions that might affect to the acoustic parameters calculation. Some attenuation coefficients are listed in order to choose the most suitable for your project conditions. You can specify the Temperature, Relative Humidity and Atmospheric Pressure (according to ISO 9613-1) or choose among the six predefined conditions according to ISO 9613-2.

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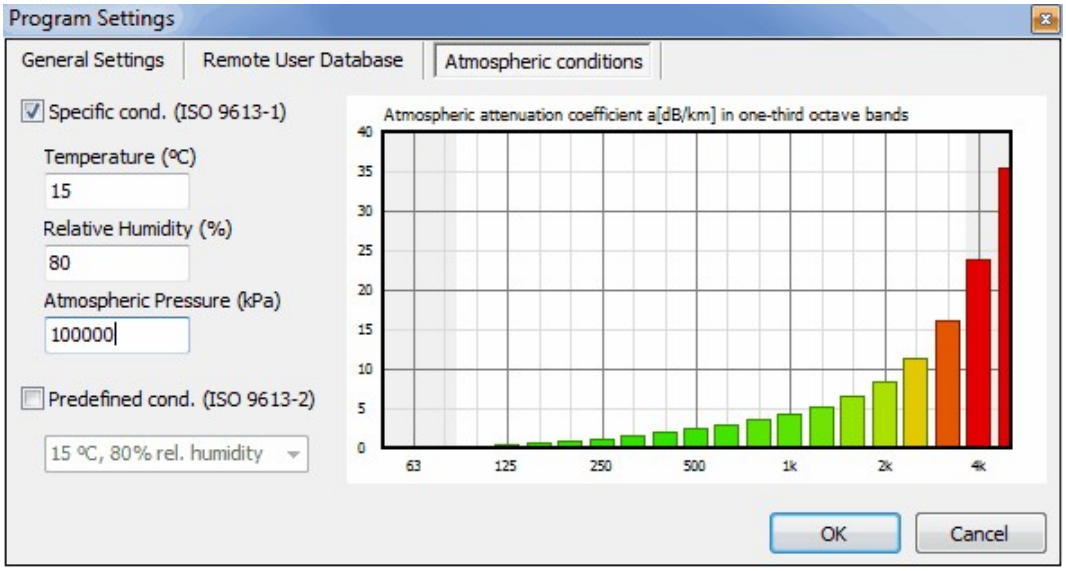
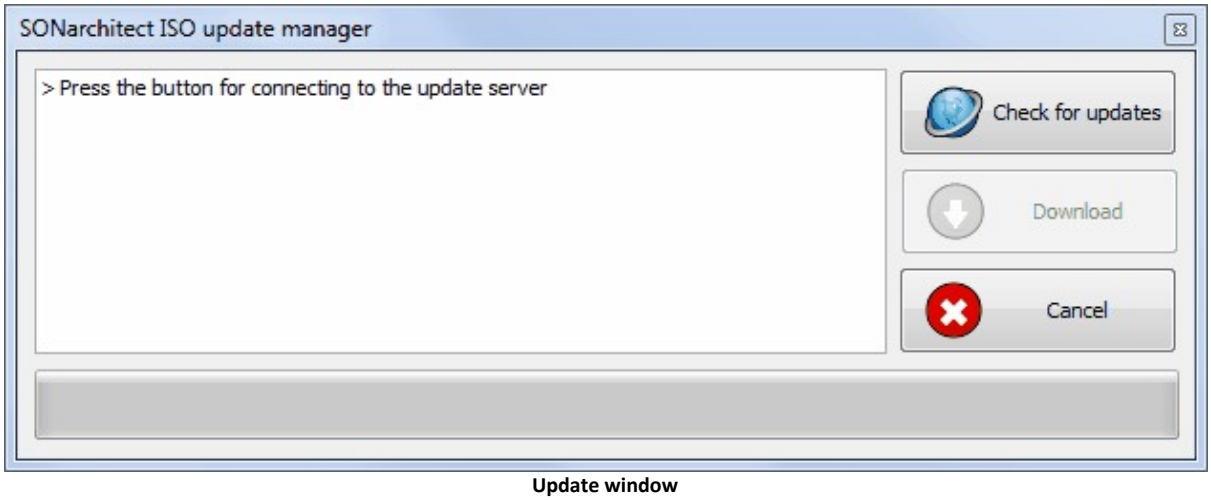


Atmospheric conditions

4.2 Updates

You will access to SONarchitect updates just clicking the Check for Updates Button:



Update window

Click Check for updates and you will download the latest update if available from our servers.

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Chapter V

Working modes

5 Working modes

SONarchitect ISO has six working modes. We have classified all the tools and group them according to its functionality in order to make it faster.

Each mode concerns a stage of the project.

Let us take a deeper study of these stages in the following chapters.

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Chapter VI

Drawing

6 Drawing

After setting up the project, you can proceed to create the different floors. This is the first stage: the drawing mode.

In SONarchitect a building consists of plans and floors. A plan is each of the different floor plans, which, by repetition, lead to the different floors of the building. This makes it possible to build a 10-floor building from, for example, 3 plans: ground floor plan, present only once, becomes floor 0, a dwellings plan, repeated 8 times, giving floors 1 to 8, and an attic plan, present only once, becoming floor 9. In the Professional version of SONarchitect a building can have as many different plans and as many repetitions as needed. The distinction between plans and floors allows not having to draw and manage as many plans as floors has the building.

SONarchitect allows the import of a DXF file as a template to draw plans from a CAD project. An intelligent cleaning of the DXF file before using it as a template is recommended, to improve its value as a template for drawing and to reduce the likelihood of operator errors. Note that the acoustic calculation as per the ISO standard requires a simple model of the building, to ensure the acoustic significance of the results. You can also use plans imported from other SONarchitect projects as templates for your project.

The figure below shows SONarchitect's initial screen.

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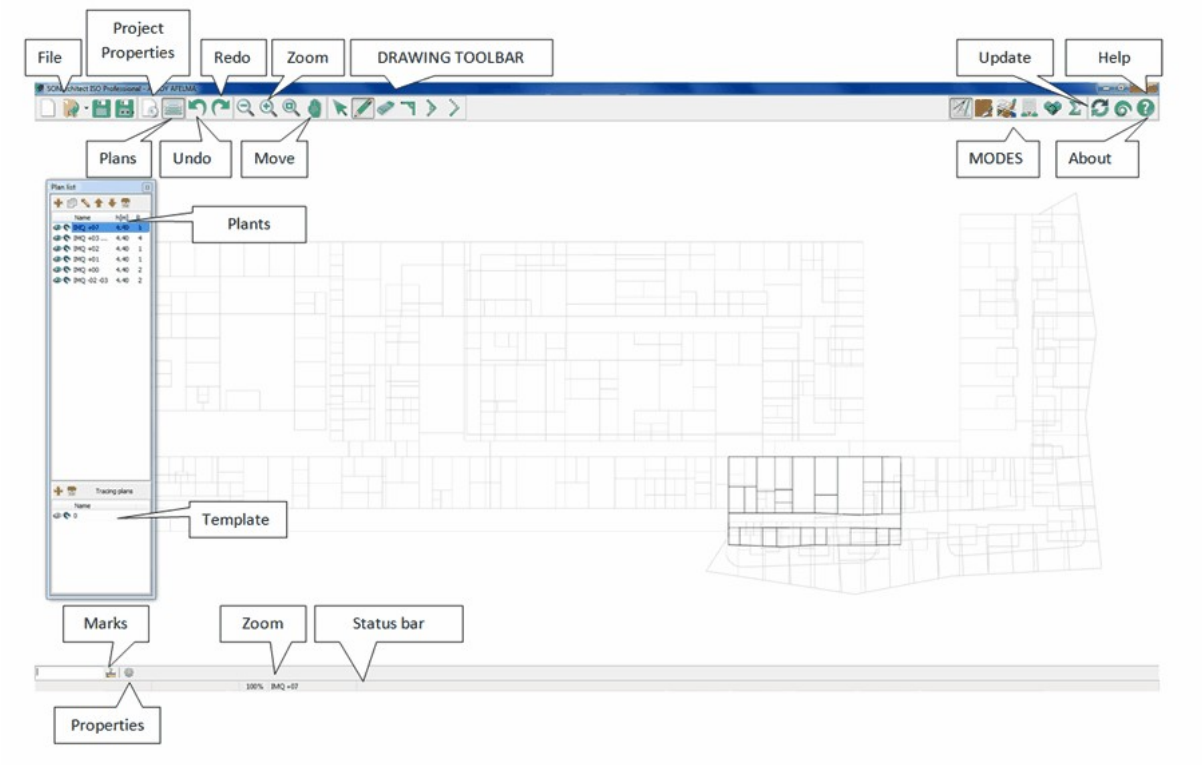

Initial desktop

Undo / Redo

During the drawing, you can undo or redo an action by pressing these buttons. You can also undo an action using the command ***[Control + Z]*** on the keyboard.

6.1 Floors

SONarchitect computes every encounter between two neighbouring enclosures in the entire building.

To do this, you have the possibility of drawing floor plans for the building floors.

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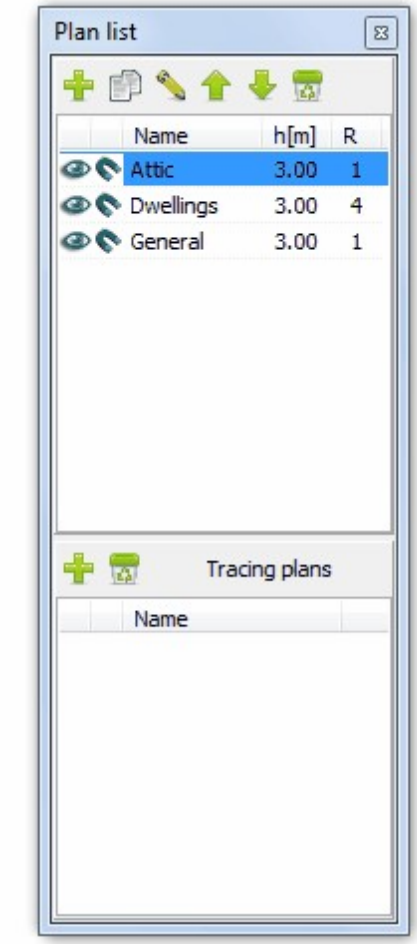

Plan List

The Plan list contains all the necessary tools to manage the plans and floors of your project. You can place it wherever you may need.

To hide the tab, just click the button Plan list again or in the X button in the top right corner.

To draw in a given plan just select it in the list. Its name appears in the status bar.

You can create a new plan and edit, copy or delete the current plan:

Clicking on new plant opens a dialog box where you can edit the name of the plant to be set up as well as its height and the number of consecutive repetitions of the plant to make way for floors. You can change any of these securities at any time.

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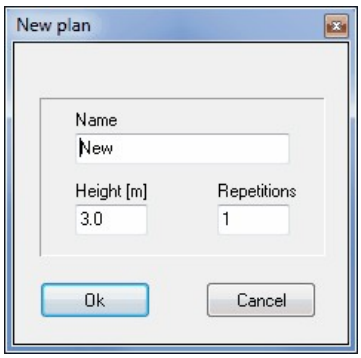
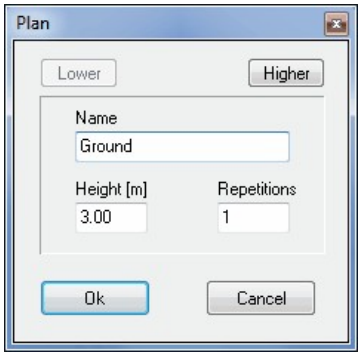


New plan

The copy plant button creates a copy of the selected plant currently adding an apostrophe to the name.

Similarly, with a plant selected from the list, clicking the edit button plant you access a dialog box where you can change its name, height and number of consecutive repetitions. For editing the properties of other plants you can use the Upper and Lower buttons without leaving the dialog.



Edit plan

With the buttons plant up and plant down you can modify the order of plant in the building. The building is constructed by stacking plans and their repetitions in the order they appear in the list: the upper floors above, and the lower floors below. We recommend that you set the proper order of your plans in the list from the very first, to avoid unnecessary relocations of plans at a late stage, which could bypass the mechanisms that control the coherence between plans, active during your drawing of the plans, thus making it possible the emergence of "microflanks" which would unnecessarily entangle the results.

Finally, to delete the selected plant, just click the Remove plant button .

To exploit the high correlation between different plans that usually exists in a building, you can use other plans as a template, represented in light gray.

To show or hide other than the current plants, just click the icon on the left , in color when the plant is visible and grayed out otherwise.

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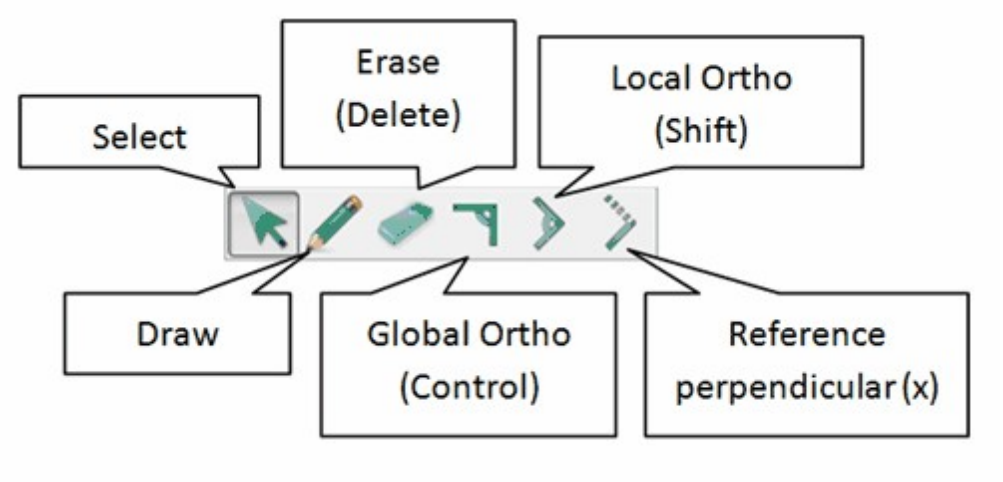
The little magnet icon on the left controls whether the drawing tool snaps to the elements of the plan to allow a perfect match between floors. If this effect is not desired, just click on the icon itself and it will turn gray, deactivating the feature.

The status bar shows which element of a line is trapping the drawing cursor.

6.2 Draw

For drawing we have the following tools:



Use the Draw tool to trace the lines representing the vertical divisions of the building. **The lines you are drawing represent the mid-line of each wall or façade.**

SONarchitect actively helps you in this task. Optional keyboard input allows accurate drawing.

Lines

Left-click or press ***[L]*** in the keyboard to begin drawing a line at a given spot in the drawing area. End the line by right-clicking if you do not want to continue a polyline, or left-clicking if you want to begin another line from the endpoint.

If a polyline or sequence of chained lines was started at a free nodal point, right-clicking will automatically close the polygon. Conversely, if the polylines started at a previous-line, right-clicking just terminates the current line.

If you terminated a line with the left button but you did not really want to continue drawing, simply press ***[Esc]***.

To draw a line linked to a previously drawn line, a snap indicator appears under the cursor that changes color depending on the kind of reference. It is green when the cursor is on the line, but at no characteristic point. This allows you to be sure that the line you draw will start

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from the original line, effectively dividing the original wall. It changes to orange when the cursor is above the midpoint of the base line or any of its ends. The snapping mechanism works also with DXF templates and other plans, as long as the magnet is on for the corresponding template layer or plan, which appear in a lighter shade under the current plan.

Select

Click this button or press ***[S]*** in the keyboard for choosing Select tool.

When we hover over a line, it turns orange, indicating that you can select it. You select lines by clicking on them, and they turn red. Subsequent clicking deselects selected lines.

Holding down ***[Control]*** temporarily activates the Move tool, which allows dragging the drawing.

Multiselection is possible by holding down ***[Shift]*** while clicking. Multiselection can also be performed by dragging with the right button:

- If you drag from left to right, the lines entirely contained in the box are selected.
- Conversely, if you drag from right to left, lines partially or totally contained in the box are selected.

Click in any empty region of the drawing or press ***[Esc]*** for unselect all.

Delete

To delete the selected segments simply press ***[Delete]*** or the Eraser button for that purpose.

Dimensions

Dimensions in the status bar

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By pressing the Dimensions button in the lower bar, all lines in the current plan are annotated.

To specify a precise length for a line during drawing, you can enter the exact length in meters in the lower left box, and then press [Enter] to draw the line. If the length is followed by the "a" letter and an angle in degrees, the line is drawn with the specified length and at the specified angle with the X-axis.

For example, when drawing a line, input 4.5a35 to draw a line of 4.5 meters at an angle of 35 degrees with the X-axis.

Perpendicular

Perpendicularities are controlled by means of the Ortho features:

- Global Ortho : When the user draws a line while clicking this button or pressing ***[Ctrl]*** SONarchitect limits the drawing angles to 0 °, 90 °, 180 ° and 270 °.

- Local Ortho : When the line being drawn stems from an earlier line, the base line is highlighted in orange as the current reference line. If you click this button or hold down ***[Shift]***, the current line is limited to 0 °, 90 °, 180 ° and 270 ° with respect to the reference line. When several lines converge at the starting point, only one is the reference at a given time (in orange). To switch the local Ortho reference in clockwise order just repeatedly press ***[R]***.

- Ortho reference or Normal : By clicking it or pressing ***[X]*** you switch on and off the “Normal” mode ("Normal" appears in the status bar when enabled). When active, a blue dotted indicator line appears indicating that the line that is being drawn is perpendicular to the indicator with respect to a reference point (start or end points of any previous line). That is, when the dotted line appears, pointing at a previous nodal point of the drawing, terminating the current line right there ensures that a subsequent line from the end point to the reference point would form an angle of 90 degrees. This tool allows drawing parallelograms, but has further potential.

Lock

For a comfortable and safe usage of the input box, the drawing cursor can be locked with ***[Spacebar]***. With the cursor locked, you can release ***[Ctrl]*** or ***[Shift]*** without losing the Ortho mode currently in use. This prevents involuntary movements of the mouse from spoiling the orthogonality of a line when specifying a length. Just remember not to release ***[Ctrl]*** or ***[Shift]*** before pressing the space bar, so that the locking enters with the intended mode still

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active.

6.3 DXF Templates

The robustness of the acoustic modeling, an inherent need of the calculation method. Thus double walls, pillars or downspouts must be assimilated to two-dimensional elements characterized by adequate acoustic values, requiring the intervention of the designer.

Smart cleaning of DXF files is recommended, to remove all superfluous elements without any significance from the standpoint of ISO acoustic calculation: Plants, furniture, decoration, symbols, names, etc. It is also recommended to delete the design elements outside the area occupied by the building (compass rose, scale, frame, etc.). SONarchitect adapts the drawing surface to the templates when these are greater than the current drawing.

Is also highly recommended to explode all the lines within the DXF.

Specially if you are using some AutoCAD objects like 2DSolids:

1) mark everything and use command _convtosurface (the 2DSolids will get surfaces on theirs bottom)

2) _explode everything (the surfaces will be exploded to areas)

3) _explode everything again, and the areas will be exploded to lines.

Note that once the template is imported, the user only needs to draw the basic lines of the plan, ie those that define the enclosures.

The template management is performed in the bottom of the Plant Management panel.

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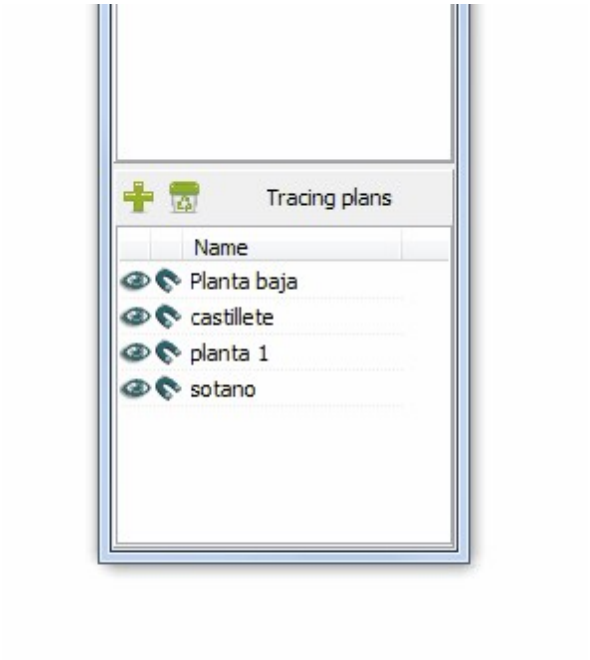

Tracing plans section in the Plans tab

Through the new template button specific layers can be loaded from a DXF file (click *All* button to select all, or unselect all clicking *None*). Each layer is a template. Different templates can be used together or separately. If you want to delete some of the imported templates, you only need to click the delete template button .

The figure shows the dialog for importing a DXF file that allows choosing the layers to import and add as templates. It is important to note that SONarchitect works in METERS. To suit this unit, the import dialog permits to specify the scale of the imported template and the unit.

You can also choose the coordinate system in order to locate the DXF model within SONarchitect drawing zone. Indeed, when the DXF drawing is not centered SONarchitect automatically relocate it when it is more than 2km away from the origin.

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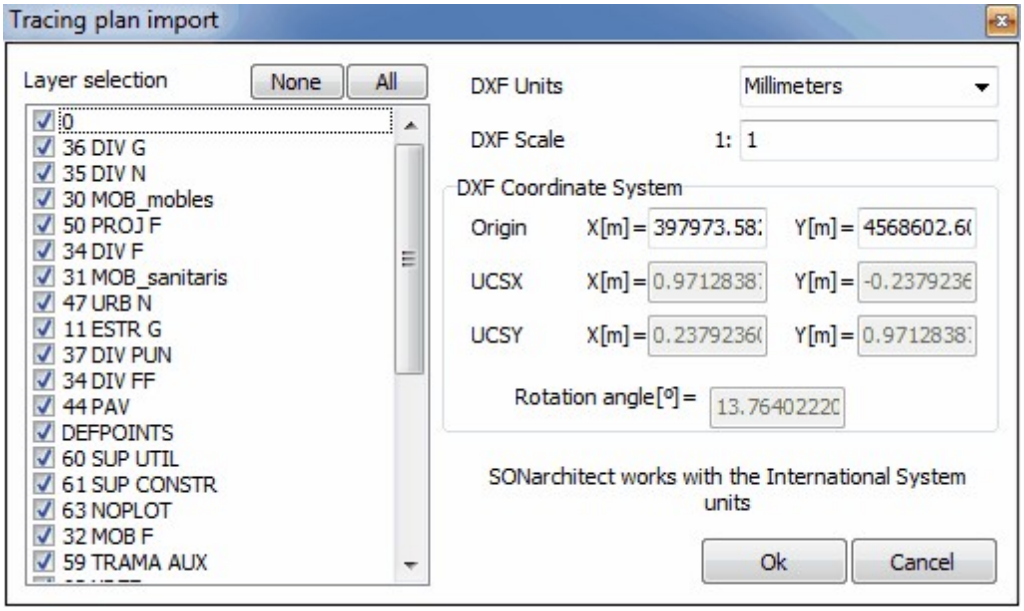

DXF import

Templates with the icon active are appear in light grey in the drawing area, allowing the taking of references.

The inclusion of a template is functionally analogous to the representation of different plans under the current plan.

Thus, the Pen tool snaps to the templates. This feature is activated and deactivated by the magnet icon to the left of each template in the list. The status bar indicates the kind of snap in action. Ortho and Normals also work with active templates.

6.4 Zoom

The Zoom permits pan and zoom the view of the current plane, in both 2D and 3D.

Additionally, for convenience, you can increase or decrease the zoom using the mouse wheel.

Scroll wheel zoom

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To retrieve the overview of the building, both 2D and 3D, there is also the Fit to window tool, .

The 2D zoom percentage is indicated at all times in SONarchitect status bar, so you have a better location of the project.

Zoom in the status bar

Move

In 2D mode, you can move around the plan by clicking anywhere on the desktop and dragging as long as the Move button on the toolbar is activated. Alternatively, to allow moving the plan without releasing the current tool, you can temporary enter Move mode by holding down ***[Ctrl]***, or even holding down the **center button of the Mouse**.

Additionally you can use the Keyboard ***[arrows]*** , thereby facilitating simultaneous drawing and moving.

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Chapter VII

Materials

7 Materials

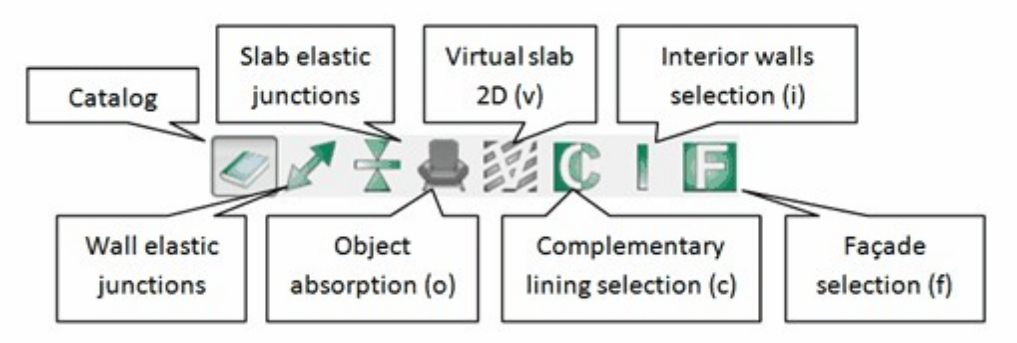
The geometric structure of the building defined, we can assign the constructive solutions.

Clicking on the tool "Materials" a range of tools appears on the right side for managing the inclusion in the model building of all the elements necessary for the insulation computation.

We can access the SONarchitect catalog of constructive solutions to identify those materials that correspond to each element of the building: materials, openings, finishings...

In the Solutions tab in Materials section the user can assign the desired constructive solutions to the elements. You can also create your own solutions and add them to the database by inserting the required data.

This is the toolbar of the Materials mode:



7.1 Catalog

Constructive solutions are assigned just by browsing the materials in the catalog database. There are two main catalogs: SON Catalog and User Catalog.

The SON Catalog contains all the built in materials in the Sound of Numbers Database.

The User Catalog will contain the materials you are creating and inserting.

You can also view the materials from the databases of several manufaturers just browsing the list:

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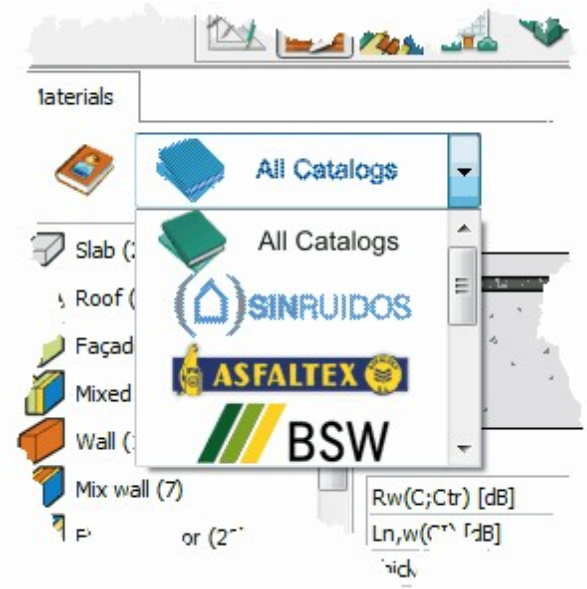

They are displayed in a tree of types. Click any type and you will see all the materials on that category.

Browse the tree and find the materials you want to assign classified by subtypes.

You can **order** the list by Descriptor, Mass and Insulation value, just clicking on the title row.

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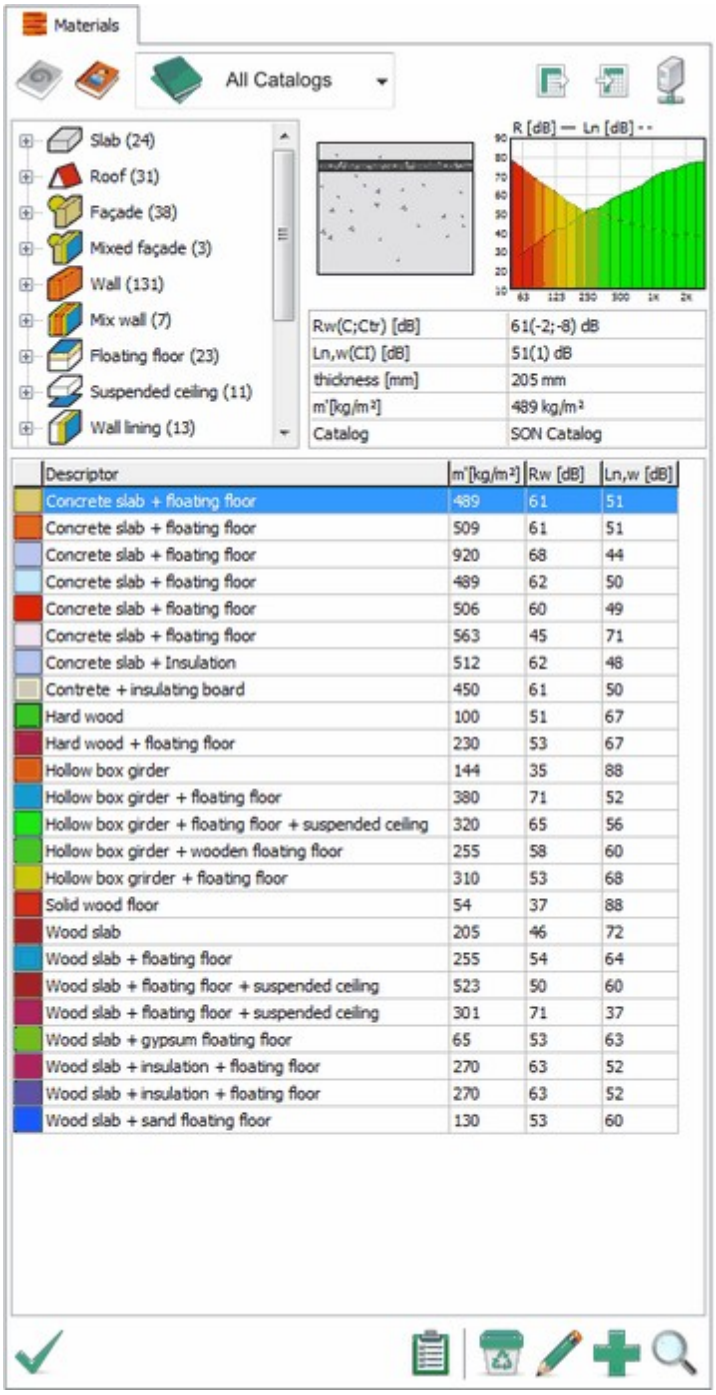
Materials
All Catalogs
Slab (24)
Roof (31)
Façade (38)
Mixed façade (3)
Wall (131)
Mix wall (7)
Floating floor (23)
Suspended ceiling (11)
Wall lining (13)
R [dB] — Ln [dB] - -
Rw(C;Ctr) [dB] 61(-2;-8) dB
Ln,w(CI) [dB] 51(1) dB
thickness [mm] 205 mm
m'[kg/m²] 489 kg/m²
Catalog SON Catalog
Descriptor | m'[kg/m²] | Rw [dB] | Ln,w [dB]
Concrete slab + floating floor | 489 | 61 | 51
Concrete slab + floating floor | 509 | 61 | 51
Concrete slab + floating floor | 920 | 68 | 44
Concrete slab + floating floor | 489 | 62 | 50
Concrete slab + floating floor | 506 | 60 | 49
Concrete slab + floating floor | 563 | 45 | 71
Concrete slab + Insulation | 512 | 62 | 48
Contrete + insulating board | 450 | 61 | 50
Hard wood | 100 | 51 | 67
Hard wood + floating floor | 230 | 53 | 67
Hollow box girder | 144 | 35 | 88
Hollow box girder + floating floor | 380 | 71 | 52
Hollow box girder + floating floor + suspended ceiling | 320 | 65 | 56
Hollow box girder + wooden floating floor | 255 | 58 | 60
Hollow box grirder + floating floor | 310 | 53 | 68
Solid wood floor | 54 | 37 | 88
Wood slab | 205 | 46 | 72
Wood slab + floating floor | 255 | 54 | 64
Wood slab + floating floor + suspended ceiling | 523 | 50 | 60
Wood slab + floating floor + suspended ceiling | 301 | 71 | 37
Wood slab + gypsum floating floor | 65 | 53 | 63
Wood slab + insulation + floating floor | 270 | 63 | 52
Wood slab + insulation + floating floor | 270 | 63 | 52
Wood slab + sand floating floor | 130 | 53 | 60

Browse the

You can even connect this catalog to a remote SQL database. Configure the conection

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clicking or in the Program settings.

You have the posibility of importing big ammount of data, batch, using an XML file: click the button and load a XML file from your computer previously exported from SONarchitect ISO or created according to the Material Exchange Format v2.0.

Or you can also export a material solution to a XML file pressing the button

As seen in the figure, the solutions are identified by a schematic drawing, a descriptor, and acoustic and physical data that characterize them. Moreover, each color has a customizable solution that can be visually located in the drawing. Initially, the elements that are not assigned to any constructive solution are displayed in grey.

If you want to see in more detail the characteristics of constructive solutions provided in the database, you can simply double-click and get a detailed datasheet:

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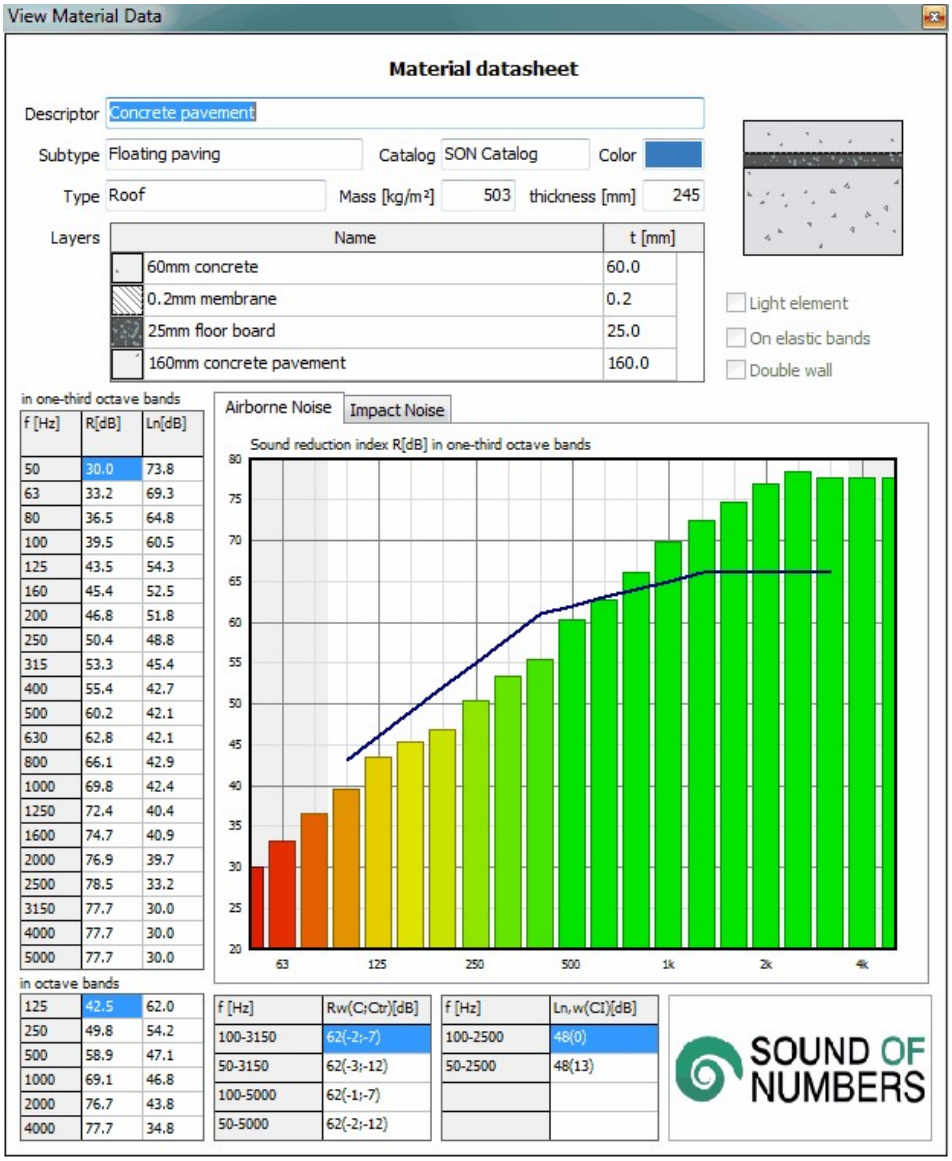

Material extended information

Double click the image in the bottom-right corner and you get the **information** about the source of the data. Press Esc for closing.

Depending on the type of solution that the user wants to assign, the elements that can be selected are clearly represented in the drawing:

Roof, slab, floating floor and suspended ceiling

When selecting any of these items you can only select enclosures, ie, polygons. When you

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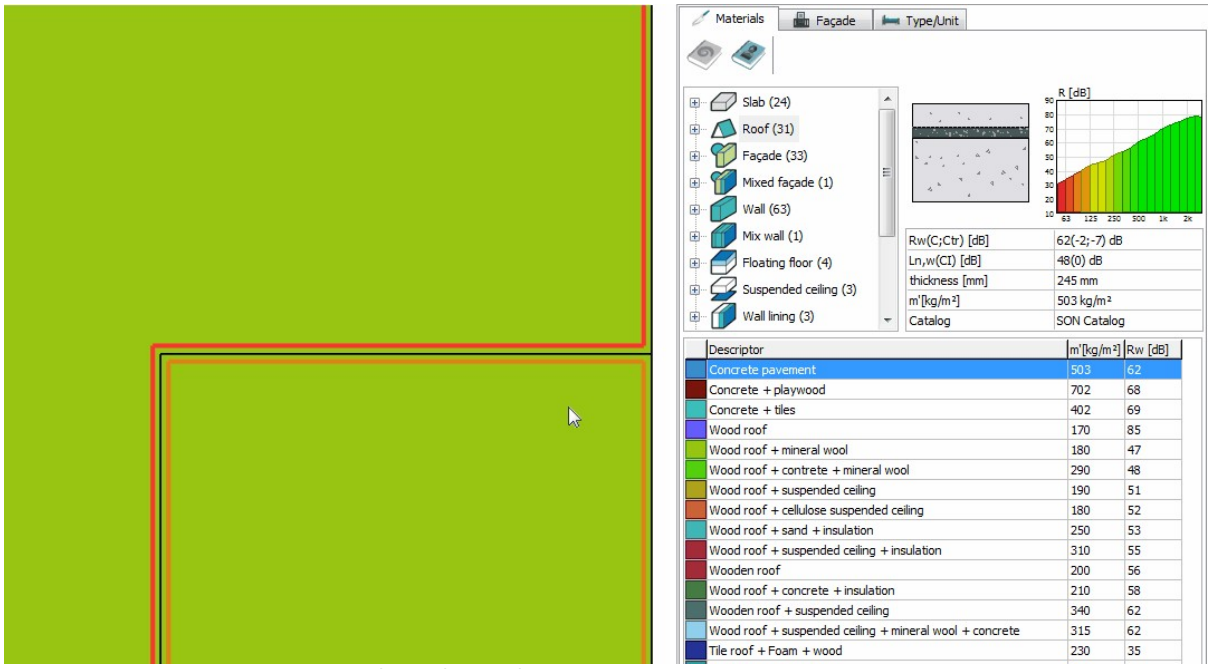
pass the cursor over, they stand out in orange and, when selected are shown in red. You can select multiple elements by pressing [Shift] and left-clicking or right-cliking and dragging the cursor.


Materials
Façade
Type/Unit
Slab (24)
Roof (31)
Façade (33)
Mixed façade (1)
Wall (63)
Mix wall (1)
Floating floor (4)
Suspended ceiling (3)
Wall lining (3)
R [dB]
Rw(C;Ctr) [dB] 62(-2;-7) dB
Ln,w(CI) [dB] 48(0) dB
thickness [mm] 245 mm
m'[kg/m²] 503 kg/m²
Catalog SON Catalog
Descriptor m'[kg/m²] Rw [dB]
Concrete pavement 503 62
Concrete + playwood 702 68
Concrete + tiles 402 69
Wood roof 170 85
Wood roof + mineral wool 180 47
Wood roof + contrete + mineral wool 290 48
Wood roof + suspended ceiling 190 51
Wood roof + cellulose suspended ceiling 180 52
Wood roof + sand + insulation 250 53
Wood roof + suspended ceiling + insulation 310 55
Wooden roof 200 56
Wood roof + concrete + insulation 210 58
Wooden roof + suspended ceiling 340 62
Wood roof + suspended ceiling + mineral wool + concrete 315 62
Tile roof + Foam + wood 230 35

Roof, slab, floating floor and suspended ceiling assignment

The specification of virtual slabs can be tedious if you have many floors and you need to define, for instance, a gap for a lift. To specify virtual slabs for repetitions of a given plan, you can use or ***[V]*** in the keyboard: Just press ***[V]*** with the slab/s you want to virtualize selected. Pressing ***[V]*** again restores the slab/s. **Note that with the 2D virtualizing tool only internal repetitions of plans are virtualized**, ie the slabs between repetitions of the current plan, but not the first or the last slab. Thus, in single-instance plans (those producing a single floor) the 2D virtualization tool has no practical effect on the building model. And if you are modeling a patio, you will have to resort to the virtualizing tool in 3D to virtualize the top slab.

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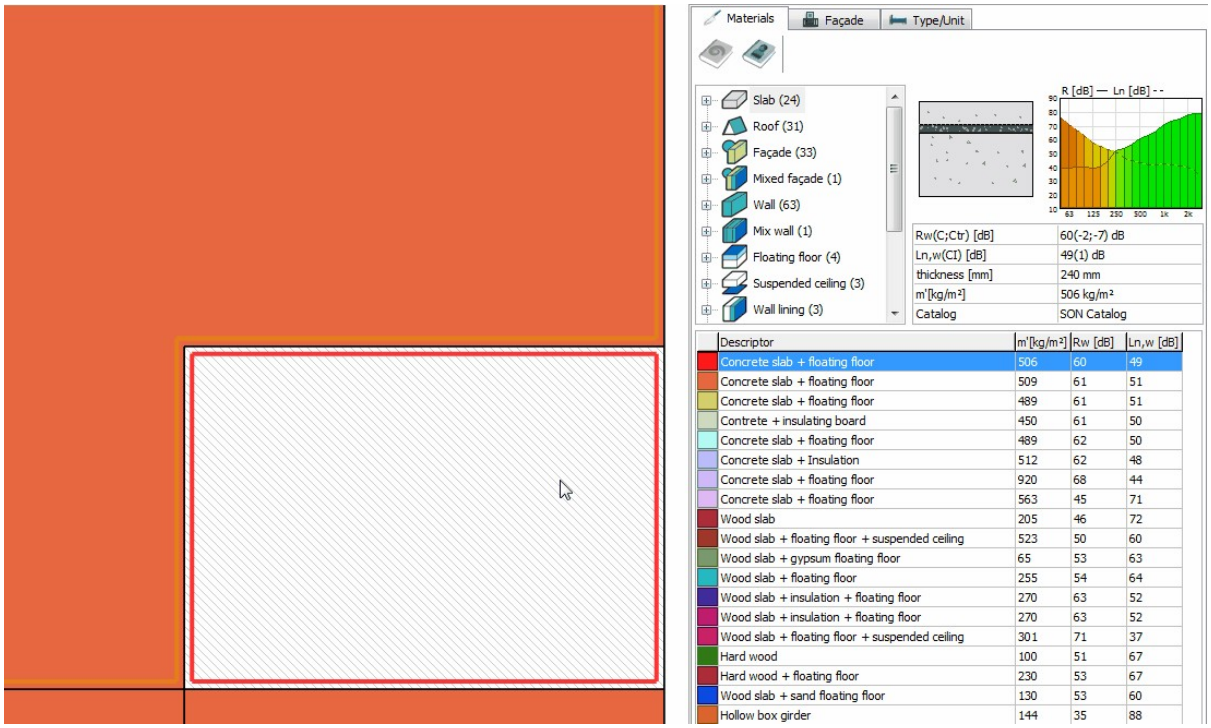
Materials
Façade
Type/Unit
Slab (24)
Roof (31)
Façade (33)
Mixed façade (1)
Wall (63)
Mix wall (1)
Floating floor (4)
Suspended ceiling (3)
Wall lining (3)
R [dB] — Ln [dB] - -
Rw(C;Ctr) [dB] 60(-2;-7) dB
Ln,w(CI) [dB] 49(1) dB
thickness [mm] 240 mm
m'[kg/m²] 506 kg/m²
Catalog SON Catalog
Descriptor | m'[kg/m²] | Rw [dB] | Ln,w [dB]
Concrete slab + floating floor | 506 | 60 | 49
Concrete slab + floating floor | 509 | 61 | 51
Concrete slab + floating floor | 489 | 61 | 51
Contrete + insulating board | 450 | 61 | 50
Concrete slab + floating floor | 489 | 62 | 50
Concrete slab + Insulation | 512 | 62 | 48
Concrete slab + floating floor | 920 | 68 | 44
Concrete slab + floating floor | 563 | 45 | 71
Wood slab | 205 | 46 | 72
Wood slab + floating floor + suspended ceiling | 523 | 50 | 60
Wood slab + gypsum floating floor | 65 | 53 | 63
Wood slab + floating floor | 255 | 54 | 64
Wood slab + insulation + floating floor | 270 | 63 | 52
Wood slab + insulation + floating floor | 270 | 63 | 52
Wood slab + floating floor + suspended ceiling | 301 | 71 | 37
Hard wood | 100 | 51 | 67
Hard wood + floating floor | 230 | 53 | 67
Wood slab + sand floating floor | 130 | 53 | 60
Hollow box girder | 144 | 35 | 88

2D Virtual slab

Façade and walls

For walls and façades, the segments are represented as shown in the figure. Here you can select segment by segment. When you pass over them they turn orange, and when selected they are shown in red. If you want to select all walls around an enclosure, just click inside of it. Multiselection works as usual.

There are two multiselection shortcuts: or ***[i]*** in the keyboard, to select all internal walls, , and or ***[f]*** in the keyboard, to select all façade walls.

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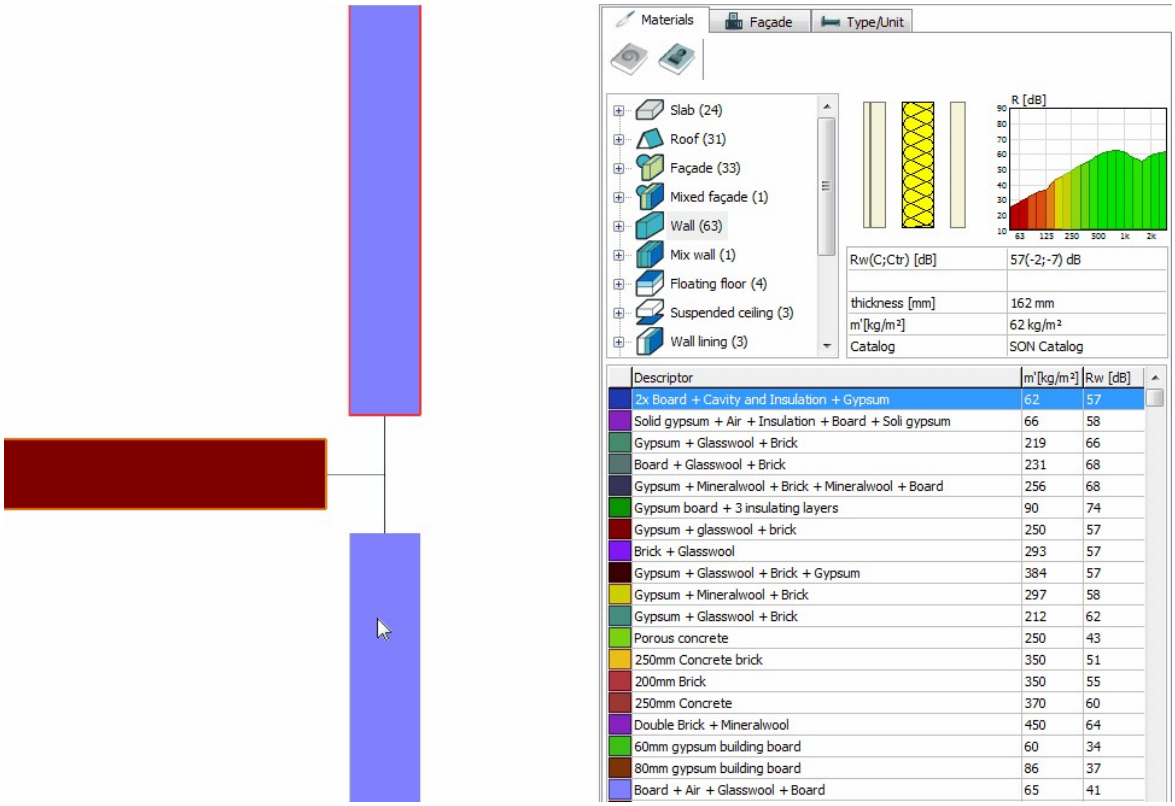
Materials
Façade
Type/Unit
Slab (24)
Roof (31)
Façade (33)
Mixed façade (1)
Wall (63)
Mix wall (1)
Floating floor (4)
Suspended ceiling (3)
Wall lining (3)
R [dB]
Rw(C;Ctr) [dB] 57(-2;-7) dB
thickness [mm] 162 mm
m'[kg/m²] 62 kg/m²
Catalog SON Catalog
Descriptor m'[kg/m²] Rw [dB]
2x Board + Cavity and Insulation + Gypsum 62 57
Solid gypsum + Air + Insulation + Board + Soli gypsum 66 58
Gypsum + Glasswool + Brick 219 66
Board + Glasswool + Brick 231 68
Gypsum + Mineralwool + Brick + Mineralwool + Board 256 68
Gypsum board + 3 insulating layers 90 74
Gypsum + glasswool + brick 250 57
Brick + Glasswool 293 57
Gypsum + Glasswool + Brick + Gypsum 384 57
Gypsum + Mineralwool + Brick 297 58
Gypsum + Glasswool + Brick 212 62
Porous concrete 250 43
250mm Concrete brick 350 51
200mm Brick 350 55
250mm Concrete 370 60
Double Brick + Mineralwool 450 64
60mm gypsum building board 60 34
80mm gypsum building board 86 37
Board + Air + Glasswool + Board 65 41

Façade and walls

Lining

When working with Wall linings, segments on each side of the walls represent the linings of each face. You can select all interior linings by clicking inside an enclosure, or individually.

In addition, you can select a complementary set of the linings selected at any time. When one or more linings are selected, clicking or pressing ***[C]*** the linings of the other face of the walls are selected.

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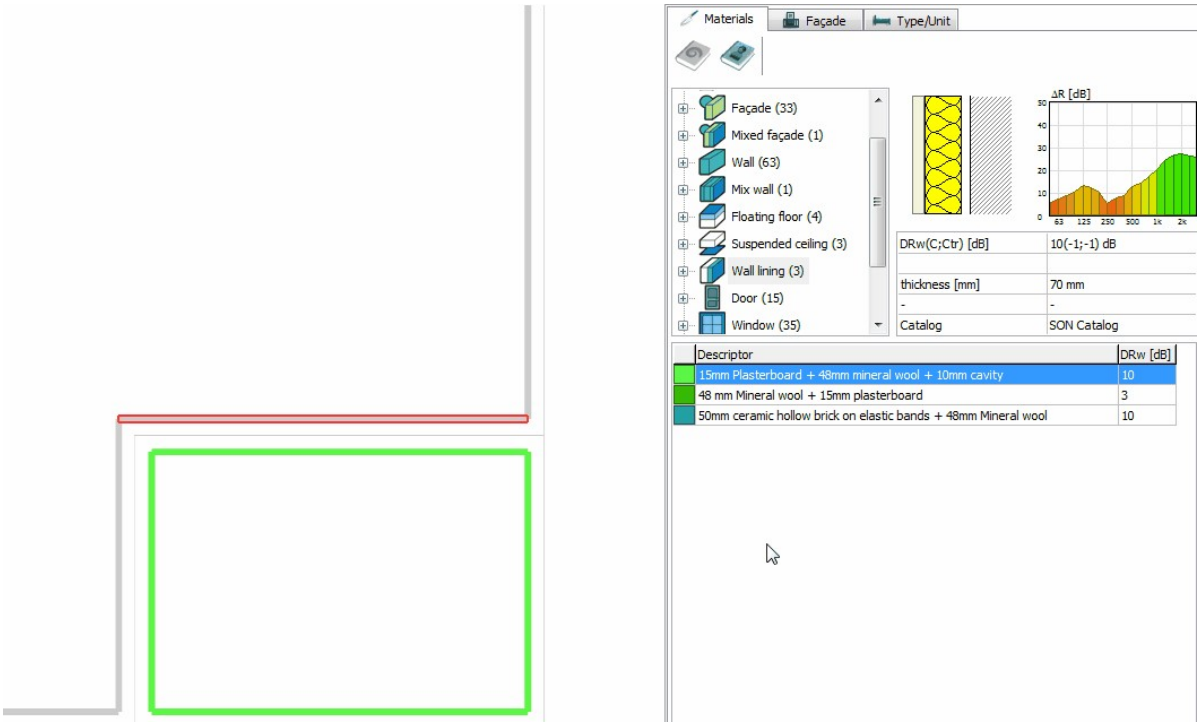

Lining

Mixed Partition and Mixed Façade

Mixed Facade type and Mixed Partition are displayed as a merge of the walls or façades and linings.

This kind of solutions assign both linings and wall at the same time. To inspect what materials have been assigned pass the cursor over the element, and you can see the solution descriptor in the status bar. The database catalog displays two color for each solution, representing the linings and the wall materials.

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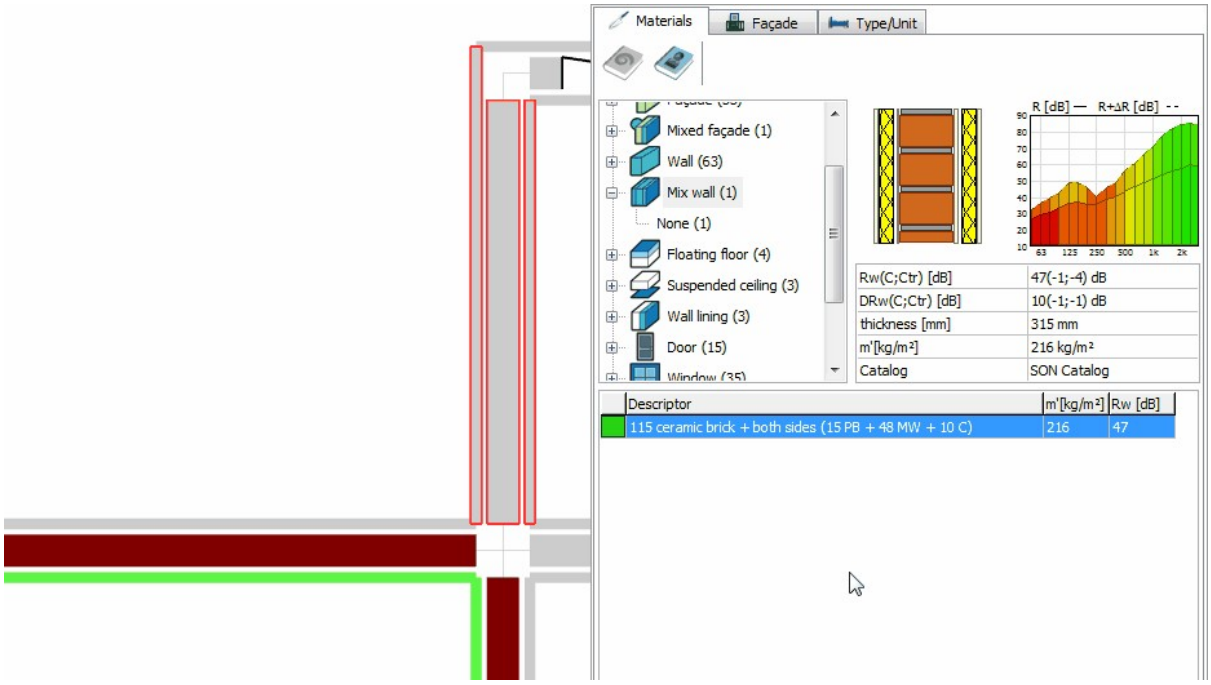
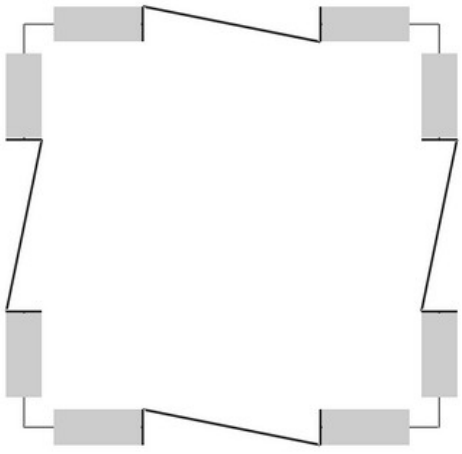


Mixed

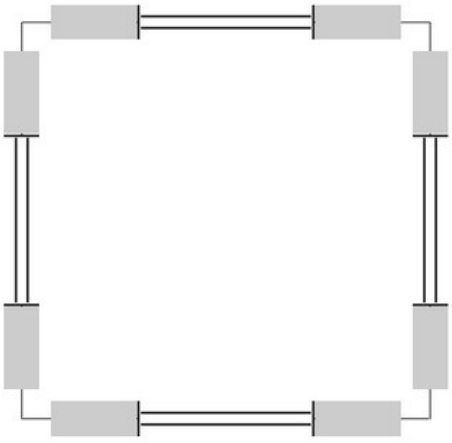
Doors, Windows, Ventilation and Blinds

For assigning these solutions, the interface is the same as for Façade and walls.

The only difference is that, instead of using colors to identify the assignment, for holes, it is being used different symbols on the segment.



Doors



Windows

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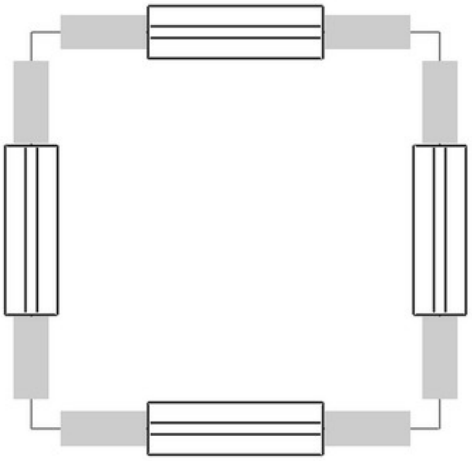
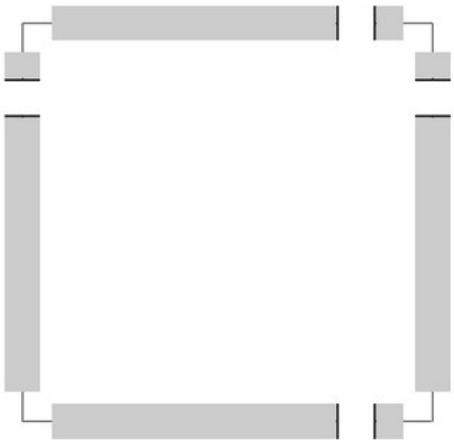


Blind over window

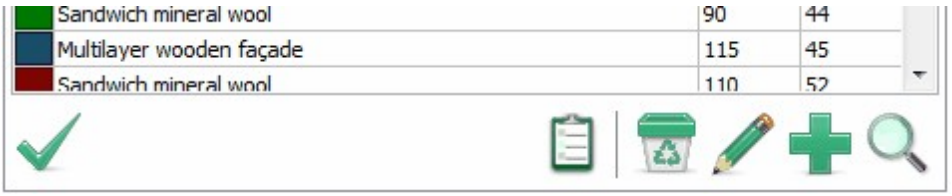


Ventilation

You can assign Windows, Blinds, Doors and Ventilation from the SONarchitect catalog, to the wall that is currently selected. Double click over that wall and a list of all openings in the currently selected wall will be displayed. You can assign more than one door, window, or blind to a wall. The symbols for doors, windows, blinds or ventilations only represent the presence of such elements in a wall, but not their numbers or their actual positions or sizes, to avoid vidual cluttering, especially in small walls. The specifics about their types, sizes or numbers can be found in the openings list at the lower part of the Openings panel. Note that for ventilations the equivalent area is specified in square centimetres. Press delete to unassign those openings.

Assignment

For all these solutions, after describing graphically how to access to allocation mechanism, you simply need to click on the button to the desired constructive solution selected in the catalog. The element is represented by the color belonging to the constructive solution and also if you move the mouse cursor over it, the solution assigned is displayed in the status bar. If you want to select all the elements having the same constructive solution, you simply select the solution in the database and click on the Show button .



If you want to remove this assignment, press ***[Delete]*** when you are in the desired type of

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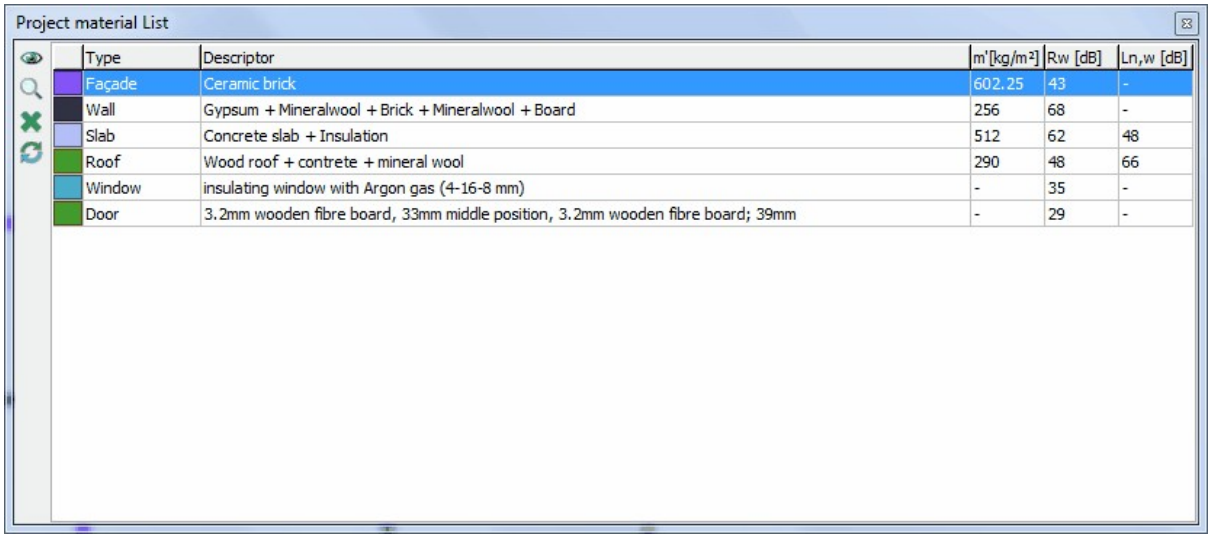
solution.

For checking all the solutions that you have assigned to your project, click the Project material list button . A list with the materials (type, descriptor and acoustic parameters) appears with some options.



With those four buttons on the left you can:

- Inspect the datasheet of the material
- Select the material in the drawing
- Unassign the elements with that material. It deletes the material from the project list
- Replace this material with the selected one in the database. You must first choose a solution in the database and then select the replaced one in the material list.

With the New button the user can create a new custom constructive solution.

To delete a solution from the database, press button , and after confirmation, it will be removed from the database permanently.

You can press Esc for closing this window.

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7.2 Absorption

It is possible to assign materials with known absorption levels to the walls, floor or ceiling on the current plan. This is relevant to the computation of reverberation times.

When selecting the Absorption in the Materials type the user interface is adapted to facilitate the selection of the element to modify.

When assigning finishings to wall linings, follow the selection mechanisms for wall linings, and when assigning to floors or ceilings , follow the selection method for slabs.

For the current version, the calculation of DnTw doesn't consider the assigned absorption. SONarchitect places the calculation in the safe side and computes DnTw with an alpha coefficient of 0,001 in all the surfaces of the room.

You can also insert an object with a certain volume within the enclosure. Select Absorption in Floor and click or press ***[O]*** key and enter the volume. This Object will have the alpha coefficient of the floor, so always insert it after assigning the floor absorption, otherwise it will disappear.

Press ***[Delete]*** if you want to unassign the alpha coefficient to the surface. If there is an Object on the floor you are pressing delete, it will be also deleted.

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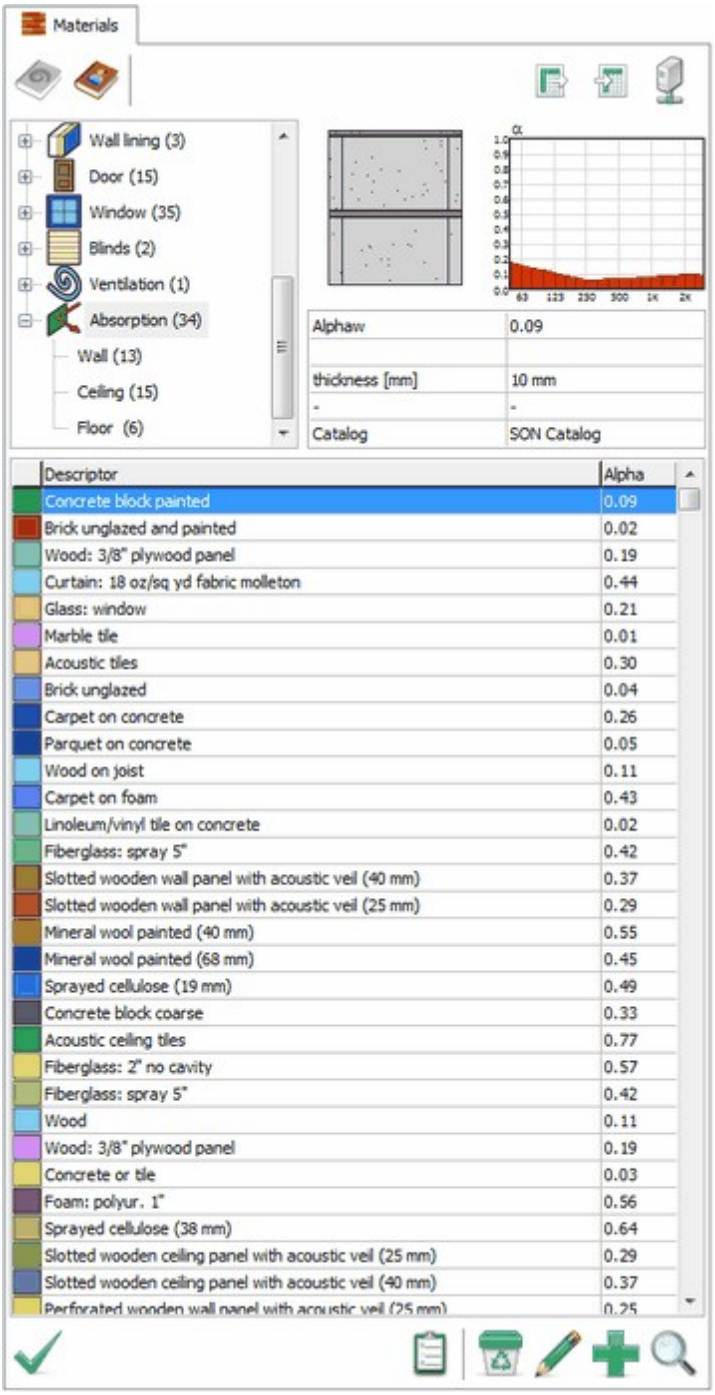
Materials
Wall lining (3)
Door (15)
Window (35)
Blinds (2)
Ventilation (1)
Absorption (34)
Wall (13)
Ceiling (15)
Floor (6)
Alphaw 0.09
thickness [mm] 10 mm
Catalog SON Catalog
Descriptor Alpha
Concrete block painted 0.09
Brick unglazed and painted 0.02
Wood: 3/8" plywood panel 0.19
Curtain: 18 oz/sq yd fabric molleton 0.44
Glass: window 0.21
Marble tile 0.01
Acoustic tiles 0.30
Brick unglazed 0.04
Carpet on concrete 0.26
Parquet on concrete 0.05
Wood on joist 0.11
Carpet on foam 0.43
Linoleum/vinyl tile on concrete 0.02
Fiberglass: spray 5" 0.42
Slotted wooden wall panel with acoustic veil (40 mm) 0.37
Slotted wooden wall panel with acoustic veil (25 mm) 0.29
Mineral wool painted (40 mm) 0.55
Mineral wool painted (68 mm) 0.45
Sprayed cellulose (19 mm) 0.49
Concrete block coarse 0.33
Acoustic ceiling tiles 0.77
Fiberglass: 2" no cavity 0.57
Fiberglass: spray 5" 0.42
Wood 0.11
Wood: 3/8" plywood panel 0.19
Concrete or tile 0.03
Foam: polyur. 1" 0.56
Sprayed cellulose (38 mm) 0.64
Slotted wooden ceiling panel with acoustic veil (25 mm) 0.29
Slotted wooden ceiling panel with acoustic veil (40 mm) 0.37
Perforated wooden wall panel with acoustic veil (25 mm) 0.25

7.3 Junctions

One of the mosttroubled in the design of acoustic insulation of a building are the junctions.

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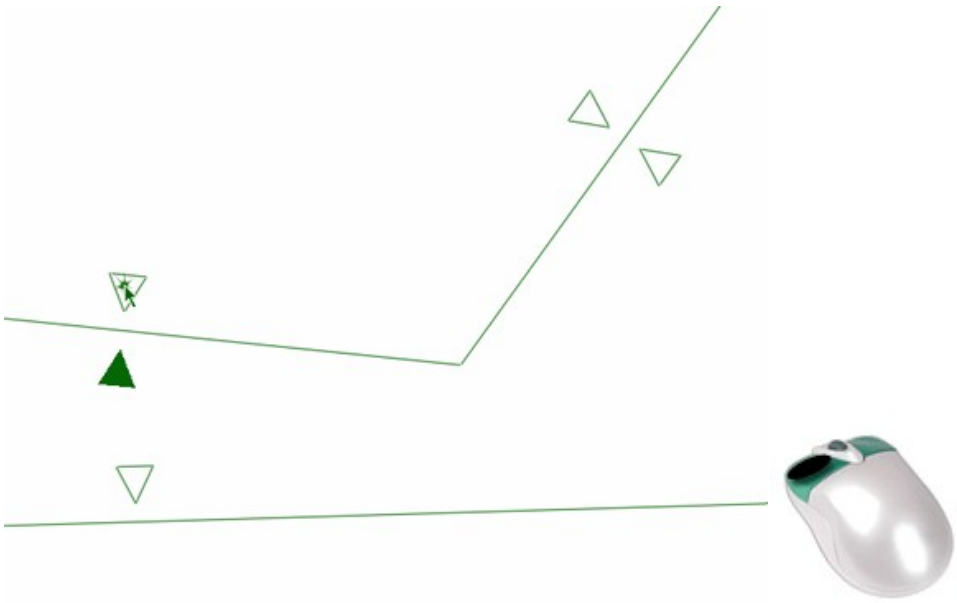
The meetings between floors and partitions or between partitions have different geometries and compositions that determine their vibrational reduction rates. SONarchitect has managed to do this work almost transparent to the user identifying characteristics of the joint automatically.

The unique feature of the board that has to be determined by the user is its elasticity. For this purpose there are two tools:

Wall Junctions Slab Junctions

7.3.1 Slab Junctions

Pressing the Slab junction button, in the 2D drawing the lines turn green and settling at the midpoint of each line two triangles pointing to each side of the line. If the triangle is white or empty means that the union is rigid. Clicking within these triangles they fill symbolizing the junction is elastic. To redefine a junction, click again and the triangle empties: rigid junction again. It is something similar at the junctions in walls.



Slab Junctions

How does it model the junctions? Check this examples:

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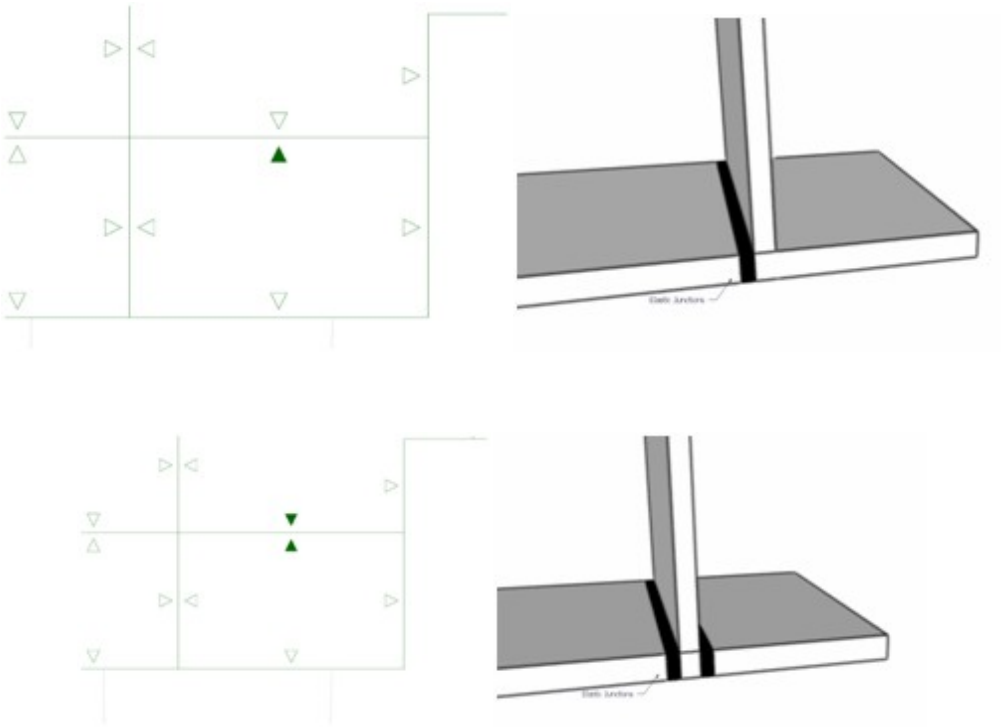

7.3.2 Wall Junctions

Following slab junctions functionality, pressing the Wall junction button, drawing 2D lines become green and slab becomes putting green lines and settling this time in the beginning and end of the line, pointing to the ends that determine the elasticity of the side junctions, and at the midpoint two triangles pointing vertically upwards and downwards, which determine whether upper and lower junctions are stiff or not. If the triangle is white, or empty, the union is rigid. Clicking within these triangles and coloured symbolizes that they are elastic. To redefine a joint return as rigid it is enough to click on the triangle to be white again.

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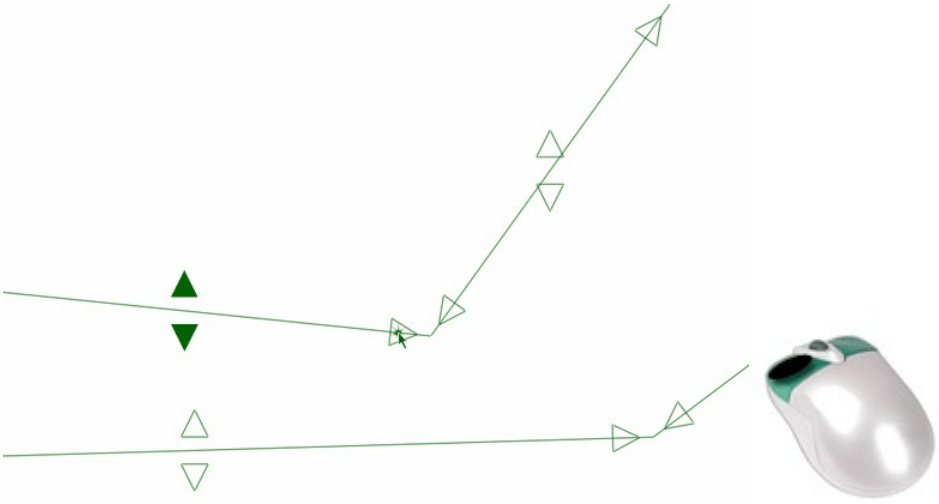
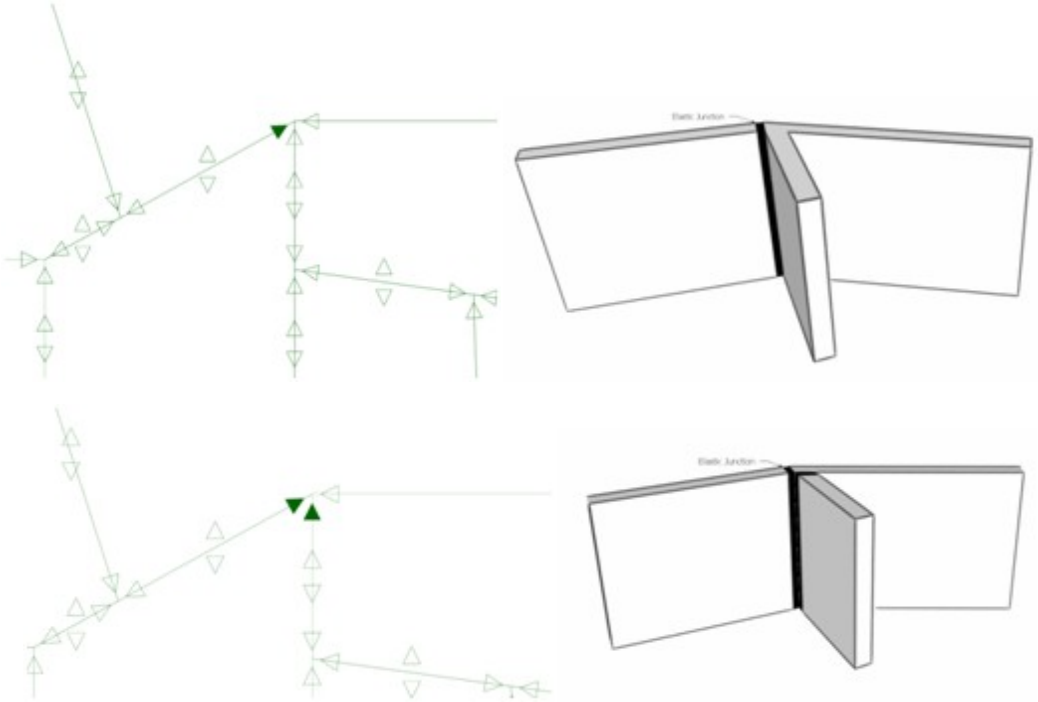


Wall Junctions

This might help: Let us see some examples of the behaviour of this tool:



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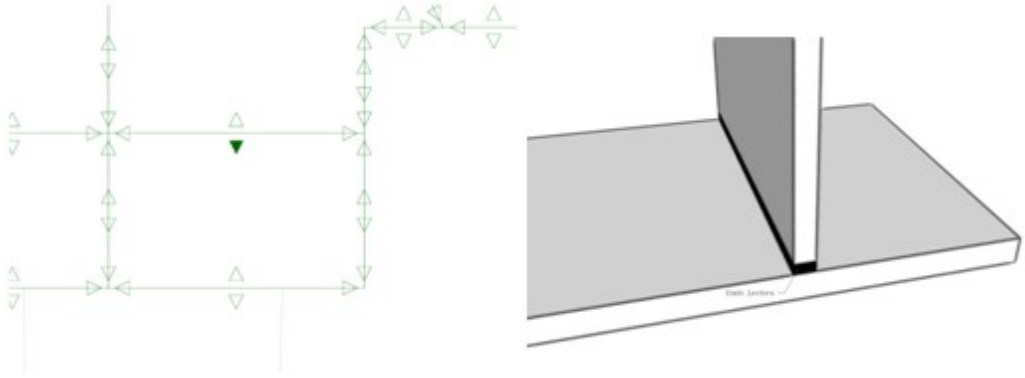
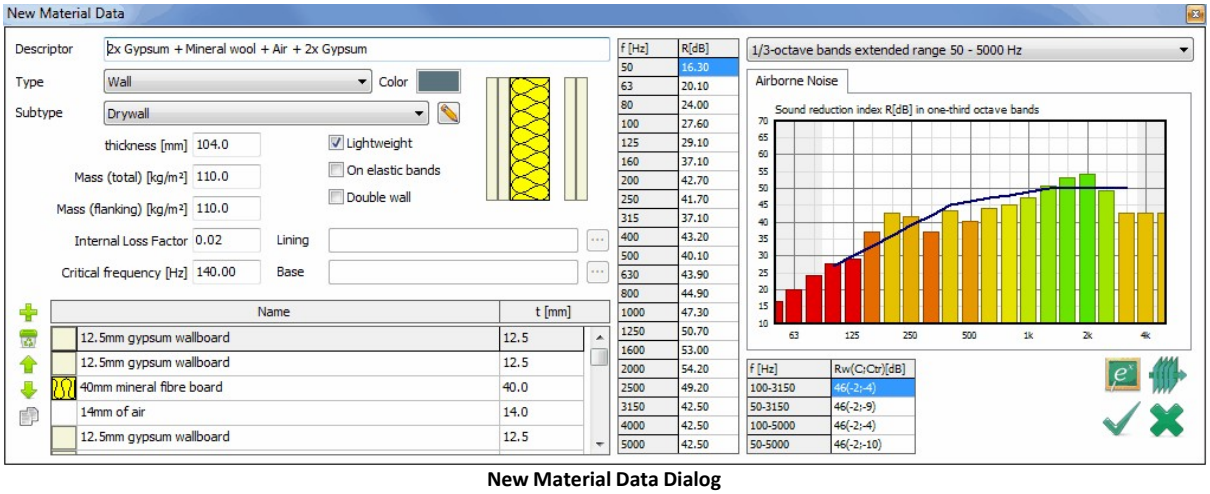


7.4 User solutions

SONarchitect, adapting the work of all engineers, enables the user to enter their own custom construction solutions, if these are not included in either the catalog or belong to any of the manufacturers included in the database.

If the user wants to include a new solution only needs to select the type and subtype of custom material and click the New button on the tab of materials. These solutions are also editable with the button . Be careful, **when you edit a material, it will not change the assigned materials in the project.**

You will find them in the User catalog:



New Material Data Dialog

The input data are:

- The **descriptor** of the new solution.

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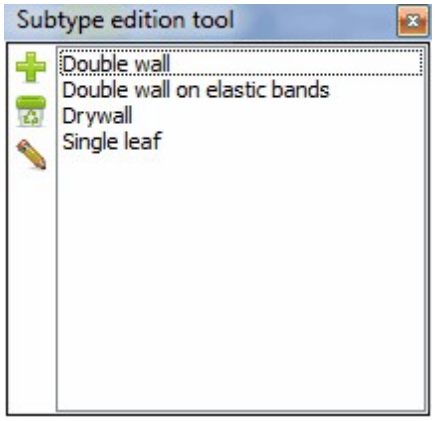
- The **type** (slab, roof, wall...)
- The **subtype** classification**.** You can add new ones just editting the subtypes list, clicking the button on the right: which opens a tool where you can create, erase or edit a subtype.



Subtype edition list

- The **color**, customizable post at any time, with which it wants to represent. By clicking on the color box opens a dialog where you can choose between many of them.
- The **material characteristics** data (thickness, mass...)
- Check **lightweight** if it's a light construction solution.
- **On elastic bands**, will include a elastic band below and avobe the wall automatically.
- Check **double wall** for entering the data of the wall as a flank.
- The **lining** and the **base** in case it is a mixed solution.
- The **frequency values** for Airborne Noise (and impact noise where available): you must select the frequency range first. It automatically calculates the correction factor.
- The **layers**: You can specify the material layers that compose this constructive solution. Manage this layers as usual with the layer tools (new, erase, move and copy). Insert the name and thickness of each layer. You can also select a pattern representing that layer on the automatic drawing. Double click on the first column and choose a pattern from the library ("with cavity" is a blank patter that represents an air cavity). You can also double click on the image if you prefer to load a BMP from your computer.

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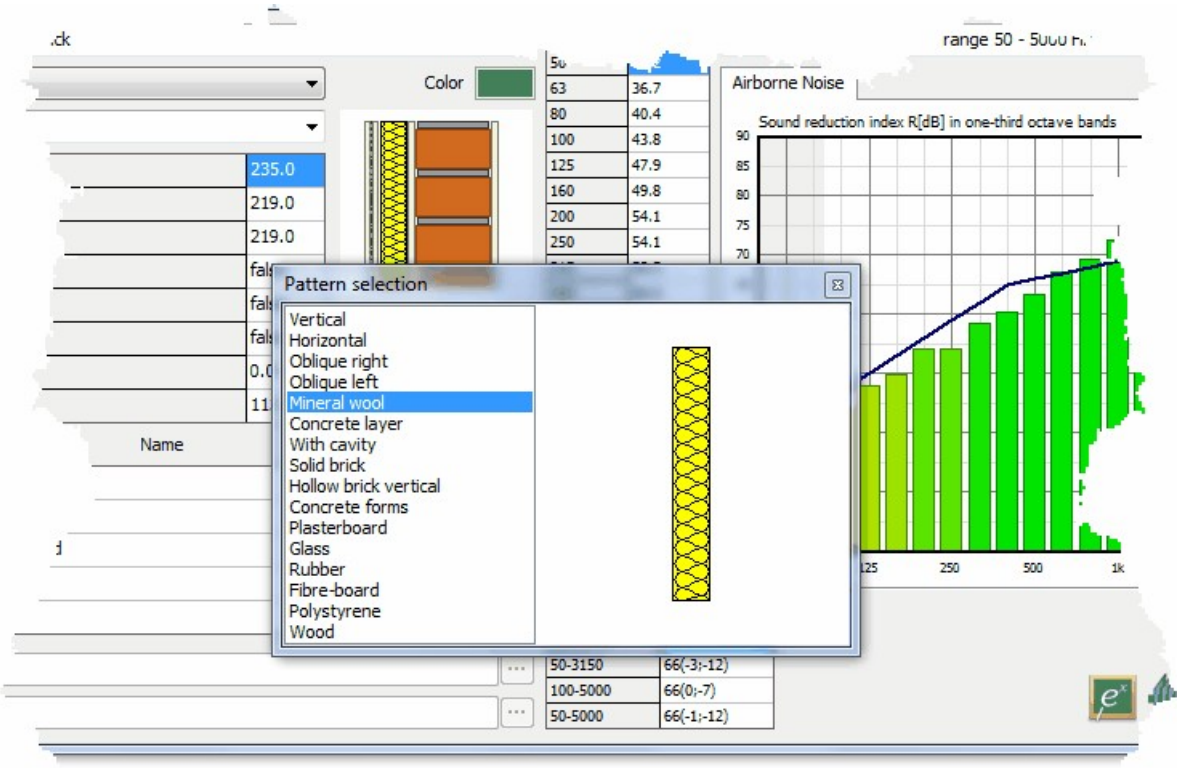

Finally, you can also create your own solutions with the SONmultilayer engine and the SONequation module .

7.5 SONmultilayer

Clicking in the SONmultilayer button inside the New Material Data dialog you will be able to calculate the acoustic insulation (Sound reduction index R) value of your customized solution.

Based on the Transfer Matrix Method you can calculate the acoustic insulation of your Multilayer solution just inserting the characteristics of each one of the layers.

Manage all the layers with the tools for that purpose . Select a layer and specify the Type of media (Solid medium, Porous medium and Acoustic fluid) and enter the physical data for the calculation. Some material characteristics can be selected from the Material Built-in database.

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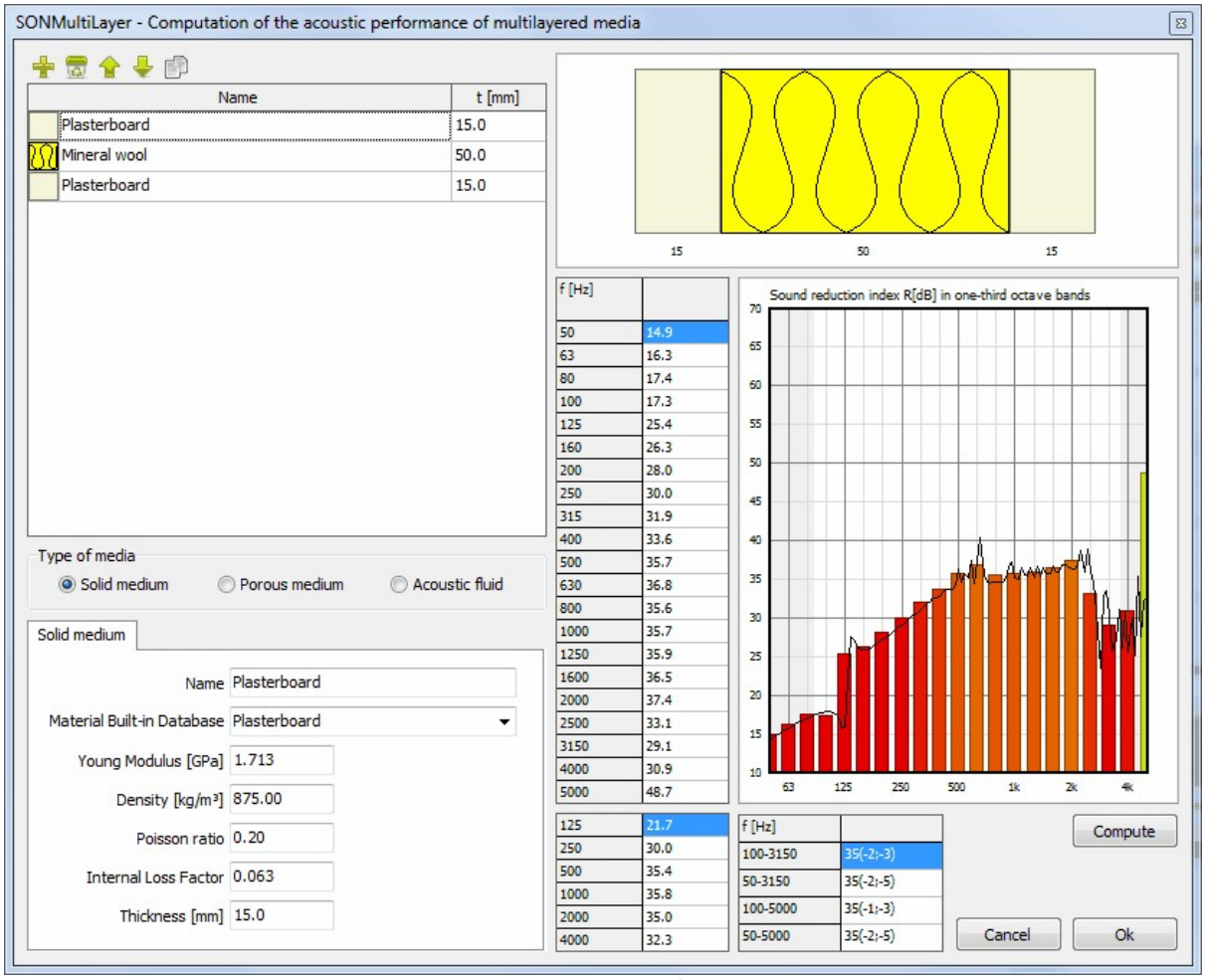

SONmultilayer Interface

Press the button Compute and the Sound reduction index in one-third octave band will be displayed. Press OK and it will be included in your solution.

7.6 SONequation

Now you can calculate your own solutions from the researched formulas in the literature. Choose the tyeof element and a model.

Enter the required physical characteristics of your solution and the modeled Sound reduction index will be displayed.

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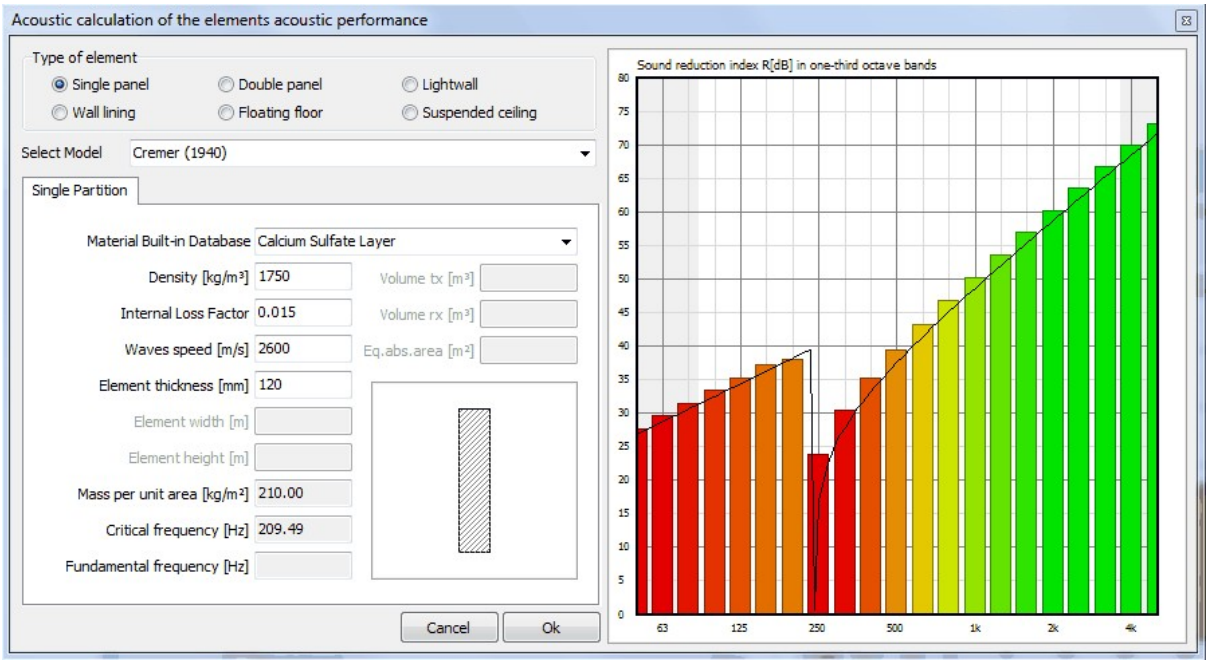

SONequation interface

You can select a model within this list of references:

- M.J. Crocker and A.J. Price, "Sound Transmission Using Statistical Energy Analysis", Journal of Sound & Vibration, 1969 9(3) 469-486.
- EN ISO 12354-1:2000, Building acoustics. Estimation of acoustic performance in buildings from the performance of elements. Airborne sound insulation between rooms, Appendix B.
- S. Ljunggren, "Airborne sound insulation of thick walls", Journal of the Acoustical Society of America, 89(5) 1991.
- A. Brekke, "Calculation method for the transmission loss of single, double and triple partitions", Applied Acoustics 14 (1981) 225-240.
- A. London, "Transmission of reverberant Sound through Double Walls", Journal of the Acoustical Society of America, 22(2) 1950.

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Chapter VIII

Uses

8 Uses

The designer needs to differentiate the various units of use (typically dwellings) within the building, and the type of use of the different enclosures. This is done through the Uses tab.

A unit is a set of enclosures (it may contain just a unique room) which correspond to a single dwelling or organizational unit. Thus, the different dwellings in a residential plan are different units, and, for instance, a corridor to access the different dwellings may constitute a unit, in this case a single enclosure unit. When different enclosures are assigned the same unit, the lines between different rooms of the same unit become thin and pale, and the lines separating rooms of the same unit from those of other units become thick and dark. To assign a given room to a given unit, just select the room or rooms, and input the unit identifier in the corresponding list box. If the unit identifier already exists, it can be directly selected from the list. If it did not exist, it will be automatically added to the list, so it can be later selected for further rooms. Typically, the dwellings in a residential plan are assigned door letters, such as "A", "B", "C", etc. Non residential units, such as corridors or access halls, are assigned literal descriptors, such as "Back corridor" or "General hall". In the result tree, units will be identified by the unit identifier and also the floor number, such as "1.A", "3.C", or "2.Back corridor".

Additionally, an identifier can be assigned to each room, just for the purpose of helping the designer to interpret the results and recognize specific enclosures in the results tree. A label will appear within the enclosure in the plan for easy identification. Note that small enclosures this label may not appear in the plan, to avoid visual clutter.

You can choose among all the different uses you have created in the Requirements configuration stage.

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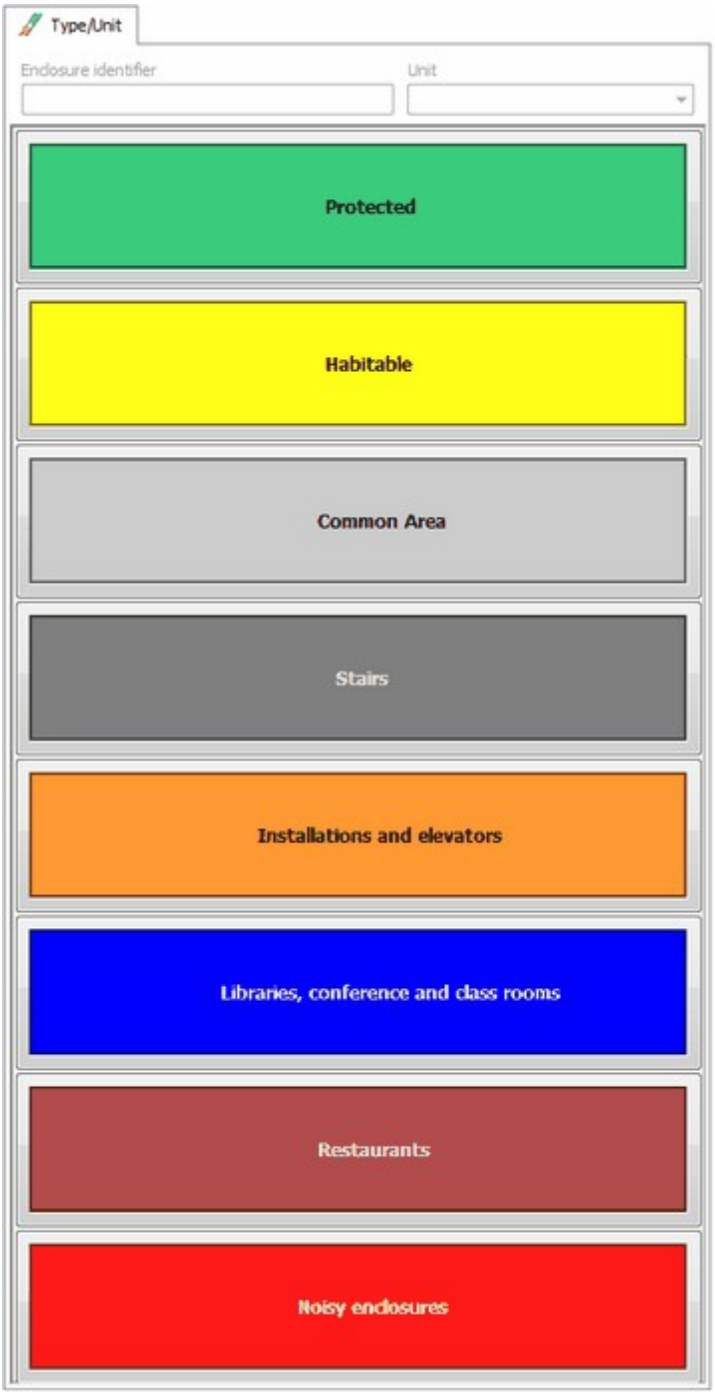

- Example: Different use unit

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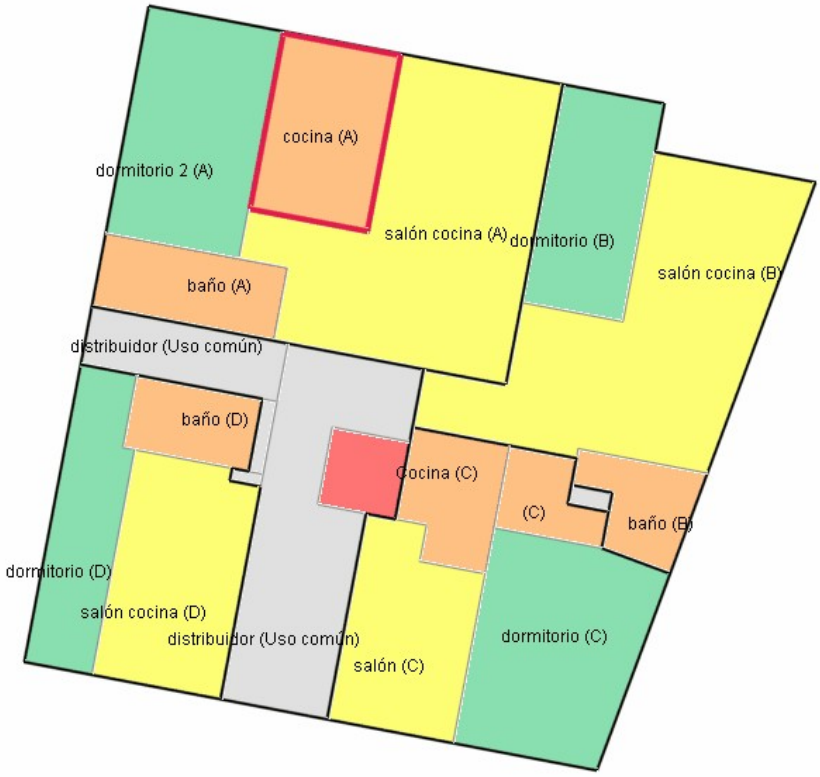

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Chapter IX

Façades

9 Façades

According to the method for calculating airborne sound insulation in walls, roofs, and floors in contact with the outside (ISO EN 12354-3) a factor ΔLfs (Improvement of insulation or difference in levels of the shape of the façade) is needed.

SONarchitect allows editing both the exterior noise level and the façade shape factor in the desired exterior walls. The incident noise can be totally customized.

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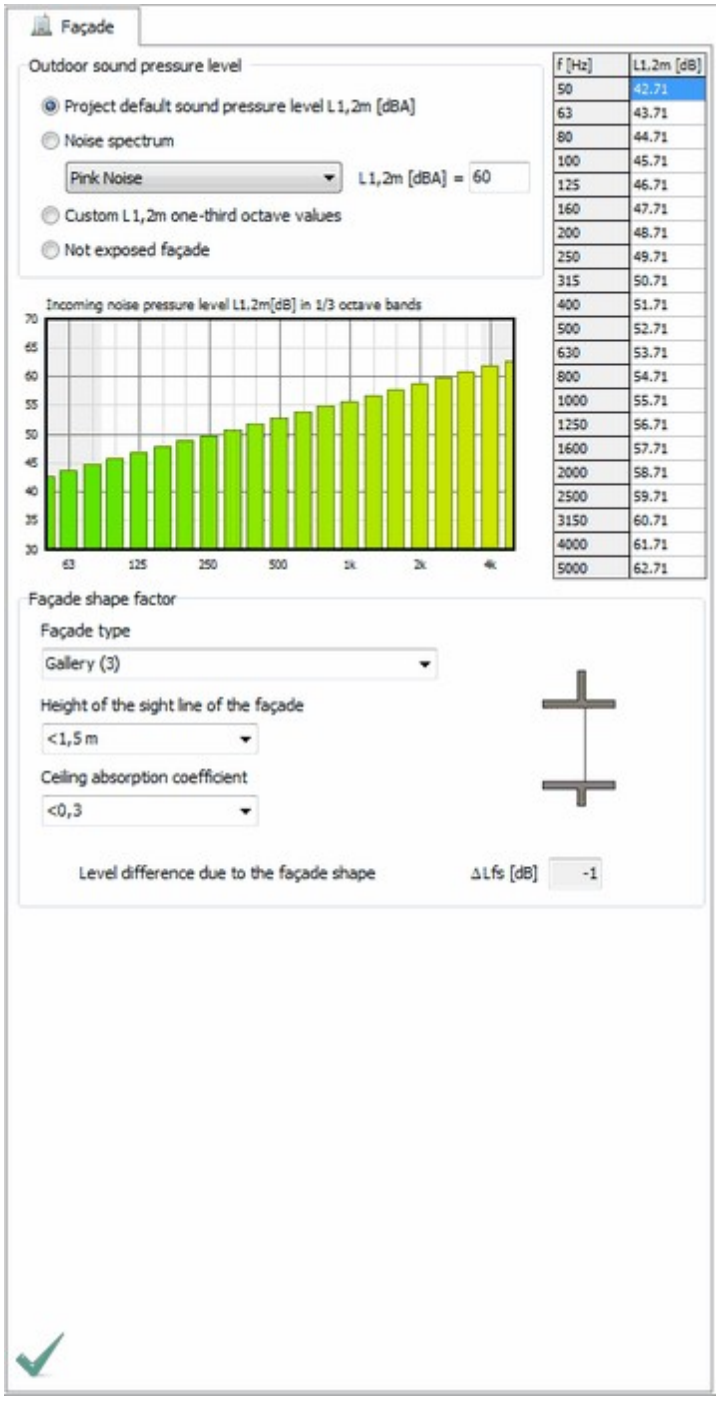

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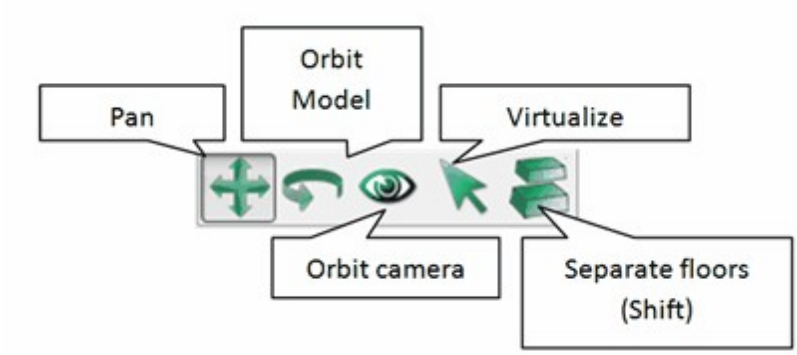
Chapter X

3D Model

10 3D Model

At any moment during the drawing you can inspect a 3D model of the building. The user can verify that the building model is consistent with the specifications, and can also define virtual slabs. Virtual slabs allow the removal of horizontal separators in the building model, allowing the definition of high ceilings, elevator shafts and facilities, courtyards, etc.



SONarchitect has three navigation modes on the three-dimensional model of the building. With these three tools the user can move the camera, rotate the model and rotate the camera.

To activate or deactivate a virtual slab in the 3D model of the building, use the Virtualize tool , to left-click inside a slab to remove it, ie “virtualize” it. You can de-virtualize again the slab by left-clicking it again. To facilitate access to the different floors, clicking or pressing ***[Shift]*** and using the scroll wheel, or using the up and down arrows in the keyboard, you can highlight one particular floor to make the "virtualizations" . Note that the 3D virtual slab tool works on an individual basis for each slab at each floor, even in the case of repetitions of the same plan. If you wish to define virtual slabs for all occurrences of a plan it is more convenient to use the 2D Virtual slab tool.

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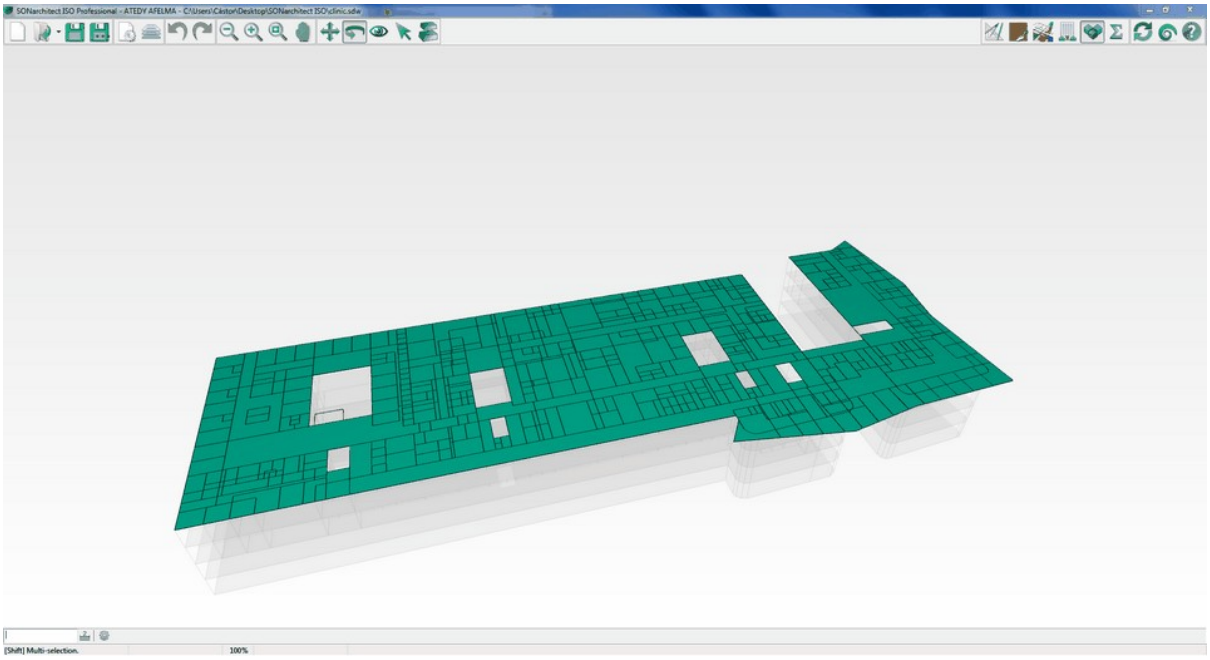

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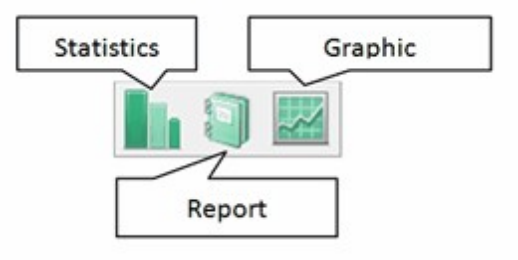
Chapter XI

Results

11 Results

After modeling the building, you can obtain all the acoustic insulation results according to ISO EN 12354 parts 1, 2, 3, 4 and 5.

This is the Results mode toolbar:



Clicking the Results button, in a matter of seconds, a panel with the results will be shown.

In case some element is missing a required constructive solution, SONarchitect will generate a warning and it will highlight the undefined element. **Warning**: Do not alarm if SONarchitect asks for a Roof solution in a plant that has no roof, this is a measure for avoiding user errors when designing Patios.

The results are classified in a tree ordered by floors. You can also find a specific calculation inserting some keywords in the area on the top of the results window and clicking the button *Filter*.

11.1 Result tree

Floors

Each floor is represented by the icon in case every room fulfill the requirements, or if any of them do not. When selection a floor, it is represented in 3D highlighting the fulfillment of every contained room.

Enclosures

Inside each one of the floors you can find the results of every enclosures in that floor. They are represented by if the room fulfill the requirements, otherwise.

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Insulation

There are two kinds of insulation:

- Insulation between rooms, represented by when fulfilling, when do not.
- Façade or roof insulation, represented by when it fulfills the requirements or otherwise.

Double-click and a dialog will show all the details of that insulation. Click the first icon on the top-right corner and add it to the Print list records, or directly click the second icon and print the record to a PDF file.

Here you can see the information of both rooms, the graphic and the data in one-third octave band, octaves and range of frequencies.

On the right you can also experience with AURALIZATION.

You can press Esc for closing.

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You may see 3 little icons on the top right corner:

Export the result sheet to an XML file

Add the result to a record into the PDF report.

Gerenate a PDF report with this result.

Airborne and impact

SONarchitect identifies each one of the contributions for airborne noise, represented by when fulfilling and otherwise and impact noise, and . You have the global result in the same line. You can also display the graphic result clicking the button Graphic .

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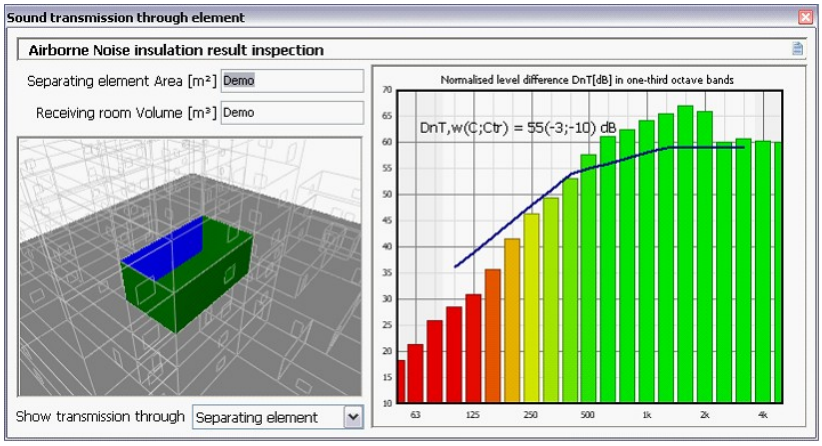
Double-click and you will also have a more detailed description in a dialog box:


Sound transmission through element
Airborne Noise insulation result inspection
Separating element Area [m²] Demo
Receiving room Volume [m³] Demo
Normalised level difference DnT[dB] in one-third octave bands
DnT,w(C;Ctr) = 55(-3;-10) dB
Show transmission through Separating element

Record

Of course, you can also print it clicking the tiny icon on the top-right corner.

Outdoor noise emission

When you have defined a requirement with an indoor noise level in a type of enclosure, the outdoor noise levels will be calculated.

These results are being grouped in the branch of the result tree called Outdoor noise map. If you press in the main point, the global outdoor noise map will be displayed.

Browse the tree and you will find the outdoor noise map of every noisy enclosure and even the emission of every individual façade.

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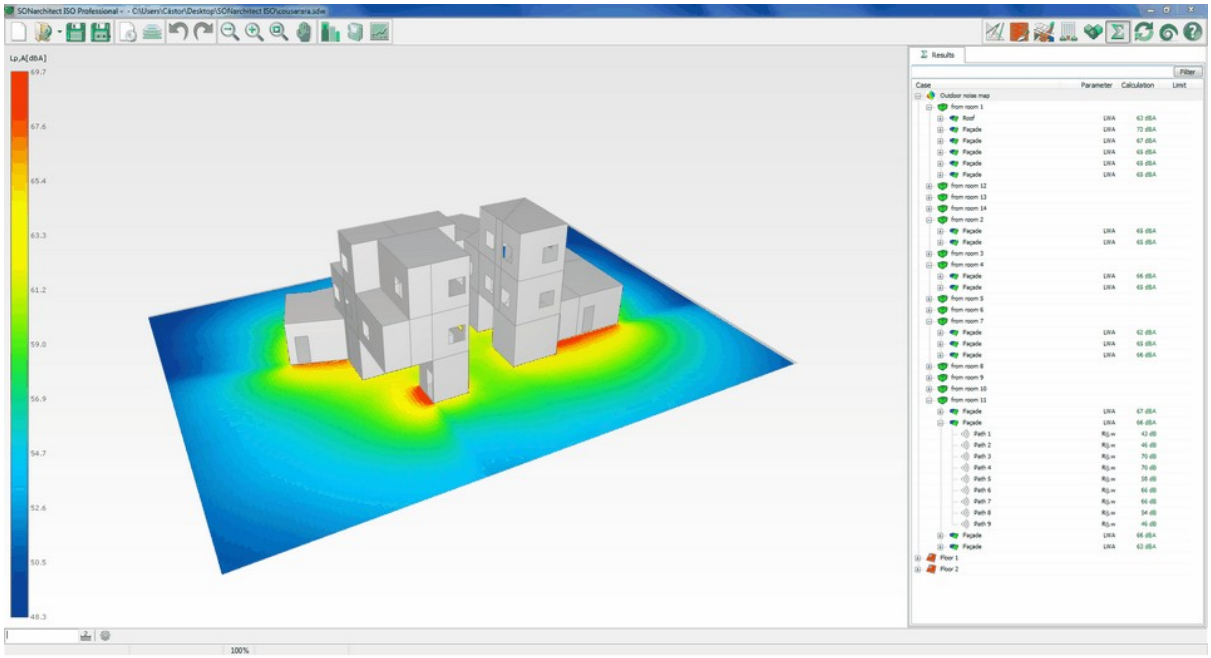

Transmission paths

Into every result, you can unfold all the transmission paths of that result. It is a very valuable information for easily identifying the acoustic insulation troubles. Because of the big amount of transmission paths it is hard to point the one to change. That is why, besides presenting the calculations you will have a color code for helping you to decide:

- This transmission path should be changed.

- It is possible that acting in this transmission path you might solve the problem.

- It is no necessary to change this transmission path, it helps the result to fulfill the requirements.

For greater insight, the user can inspect the construction solutions, dimensions and all the characteristics of the elements implied in the noise reduction index, in a given transmission path, just by double-clicking the corresponding node in the tree. A dialog, see figure, appears. You can find the basis element and the linings at both sides of the transmission path.

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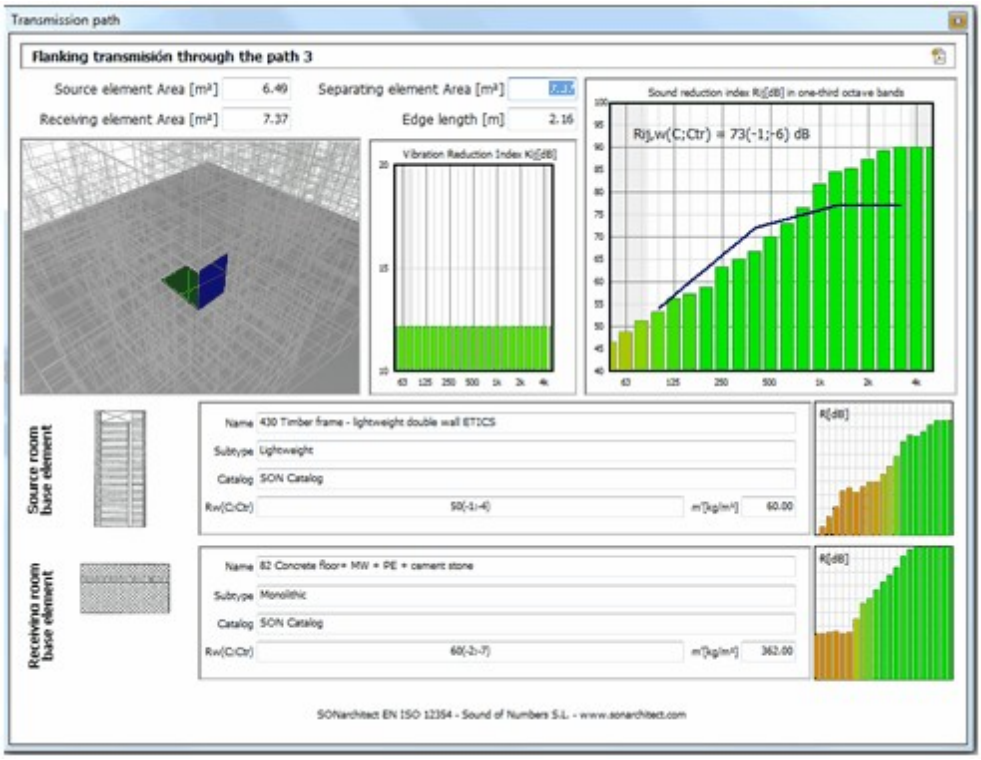
Transmission path
Flanking transmisión through the path 3
Source element Area [m²] 6.49
Separating element Area [m²]
Receiving element Area [m²] 7.37
Edge length [m] 2.16
Vibration Reduction Index Kij[dB]
Sound reduction index Rij[dB] in one-third octave bands
Rij,w(C;Ctr) = 73(-1;-6) dB
Source room base element
Name 430 Timber frame - lightweight double wall ETICS
Subtype Lightweight
Catalog SON Catalog
Rw(C;Ctr) 50(-1;-4)
m'[kg/m²] 60.00
Receiving room base element
Name 82 Concrete floor+ MW + PE + cement stone
Subtype Monolithic
Catalog SON Catalog
Rw(C;Ctr) 60(-2;-7)
m'[kg/m²] 362.00
SONarchitect EN ISO 12354 - Sound of Numbers S.L. - www.sonarchitect.com

Transmission path inspection

You can print a report of this transmission path clicking the icon on the top-right corner.

To inmediatley address any possible problem with a troublesome transmission path, just press ***[G]*** and SONarchitect will "Go to" the 2D view and will select the weak element for you.

Openings

When the direct path has some opening into its structure you can inspect the results corresponding to all the openings, just by clicking the appropriate node in the tree.

- Wall
- Door
- Window
- Blind
- Ventilation

"Microenclosures"

During the design process some tiny enclosures may by unconsciously generated by the

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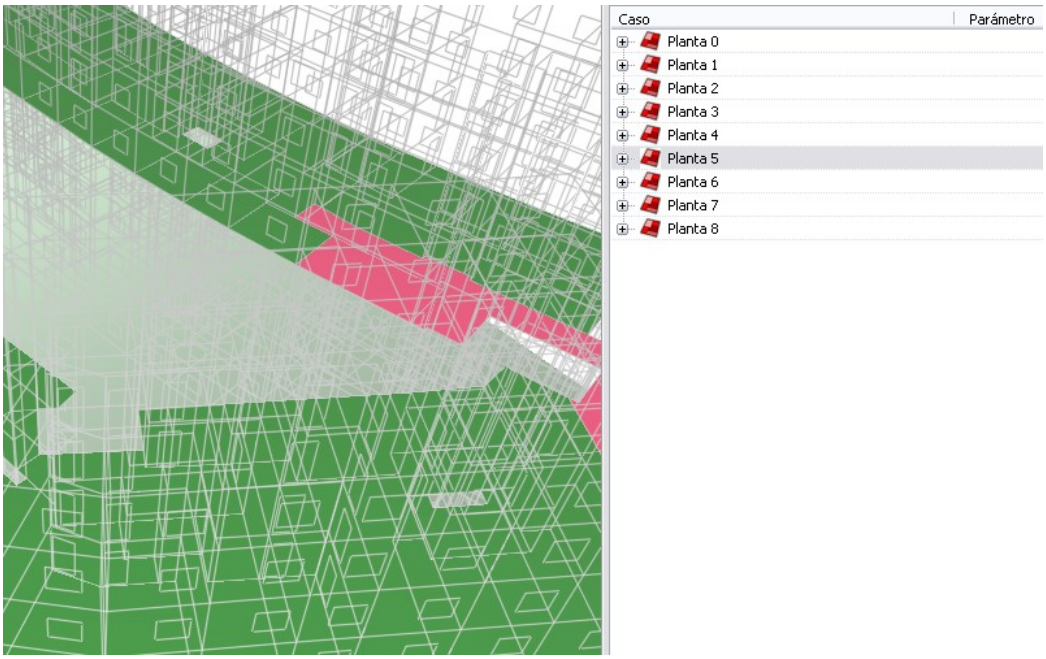
designer, “microenclosures” which would constitute irreal flanks without any acoustic meaning. During the drawing SONarchitect supervises the design to try to minimize the risk of microflanks. However, if they appear anyway, SONarchitect detects them and notifies their presence in the result tree adding an asterisk * to the affected results.

Concerning the geometry, every time any result is selected in the tree, the corresponding element is displayed in the 3D model of the building. It is featured in green if it fulfills the requirements, in red if it does not. The emitter enclosure or flank is always represented in blue:



Floors

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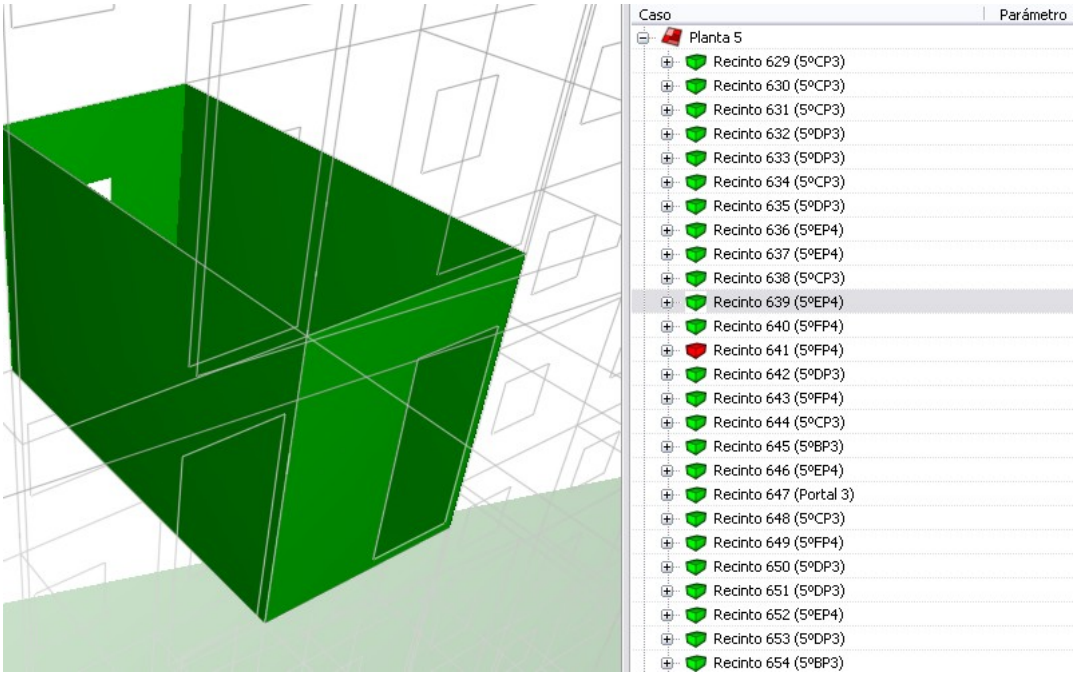
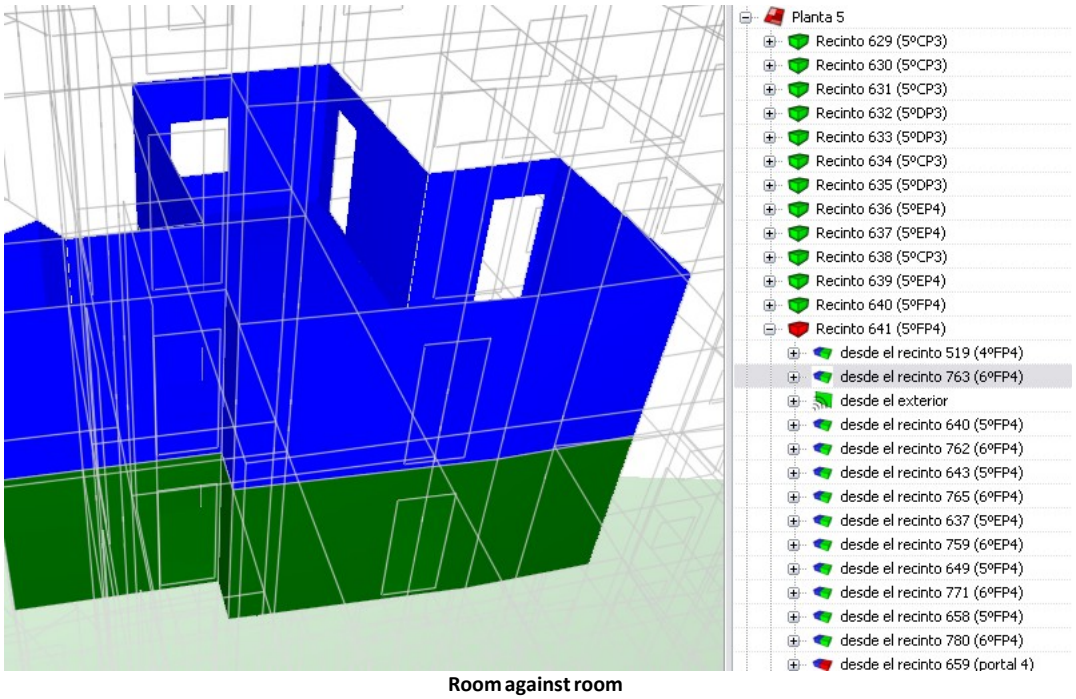


Enclosure



Room against room

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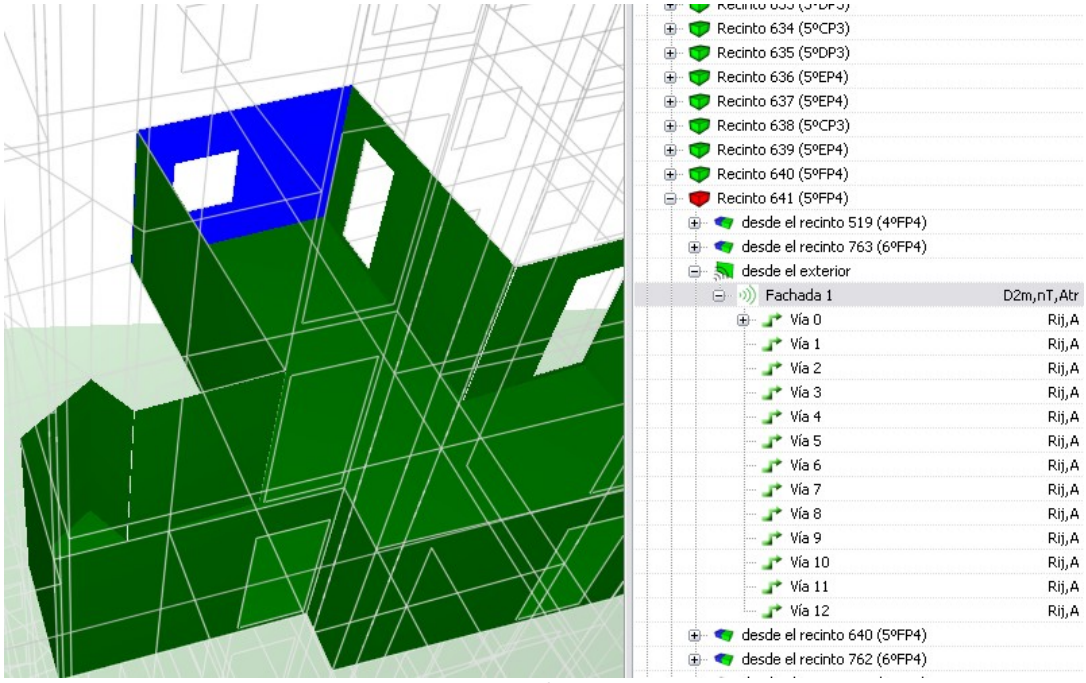
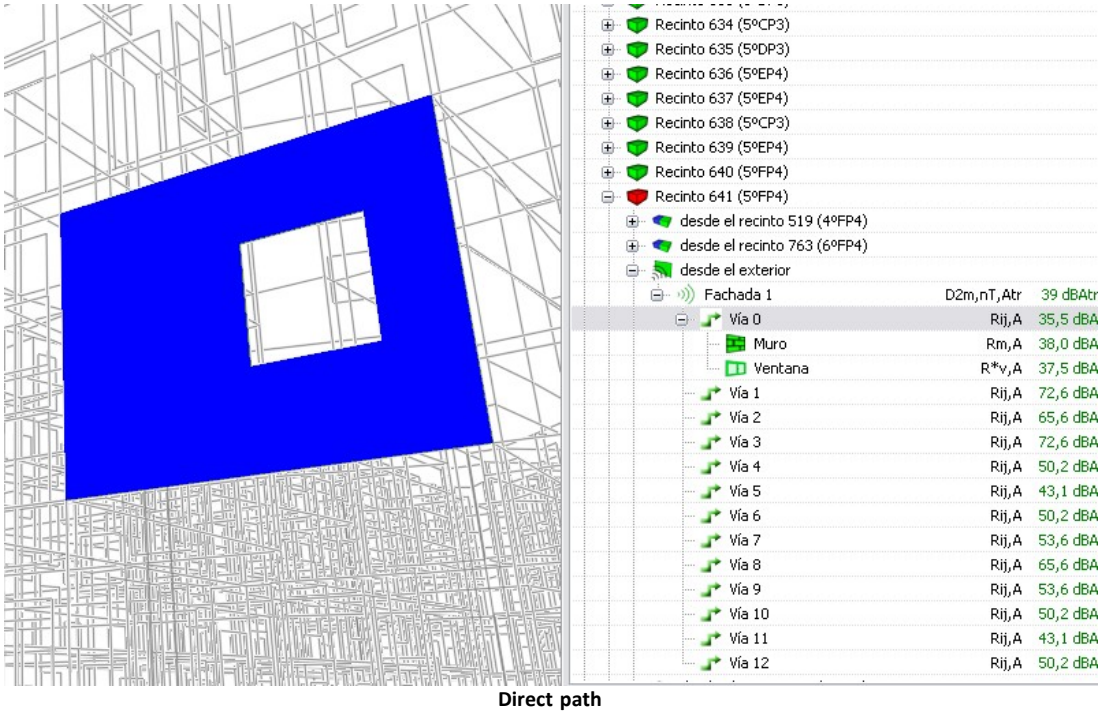


Direct façade


Recinto 634 (5ºCP3)
Recinto 635 (5ºDP3)
Recinto 636 (5ºEP4)
Recinto 637 (5ºEP4)
Recinto 638 (5ºCP3)
Recinto 639 (5ºEP4)
Recinto 640 (5ºFP4)
Recinto 641 (5ºFP4)
desde el recinto 519 (4ºFP4)
desde el recinto 763 (6ºFP4)
desde el exterior
Fachada 1 D2m,nT,Atr 39 dBAtr
Vía 0 Rij,A 35,5 dBA
Muro Rm,A 38,0 dBA
Ventana R*v,A 37,5 dBA
Vía 1 Rij,A 72,6 dBA
Vía 2 Rij,A 65,6 dBA
Vía 3 Rij,A 72,6 dBA
Vía 4 Rij,A 50,2 dBA
Vía 5 Rij,A 43,1 dBA
Vía 6 Rij,A 50,2 dBA
Vía 7 Rij,A 53,6 dBA
Vía 8 Rij,A 65,6 dBA
Vía 9 Rij,A 53,6 dBA
Vía 10 Rij,A 50,2 dBA
Vía 11 Rij,A 43,1 dBA
Vía 12 Rij,A 50,2 dBA

Direct path

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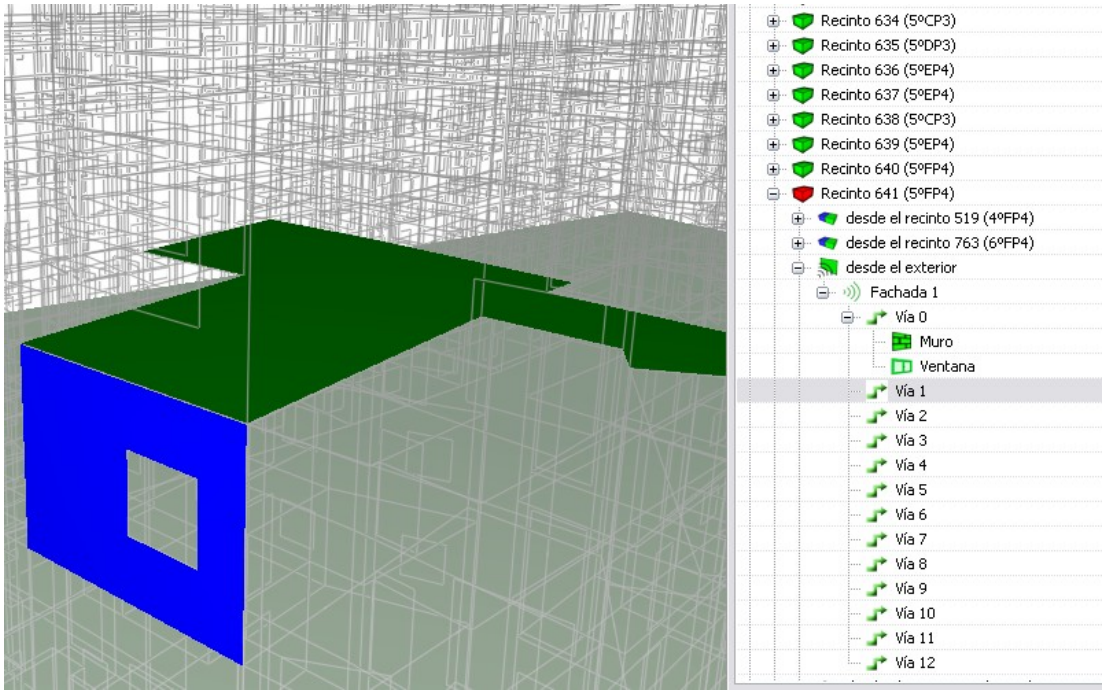
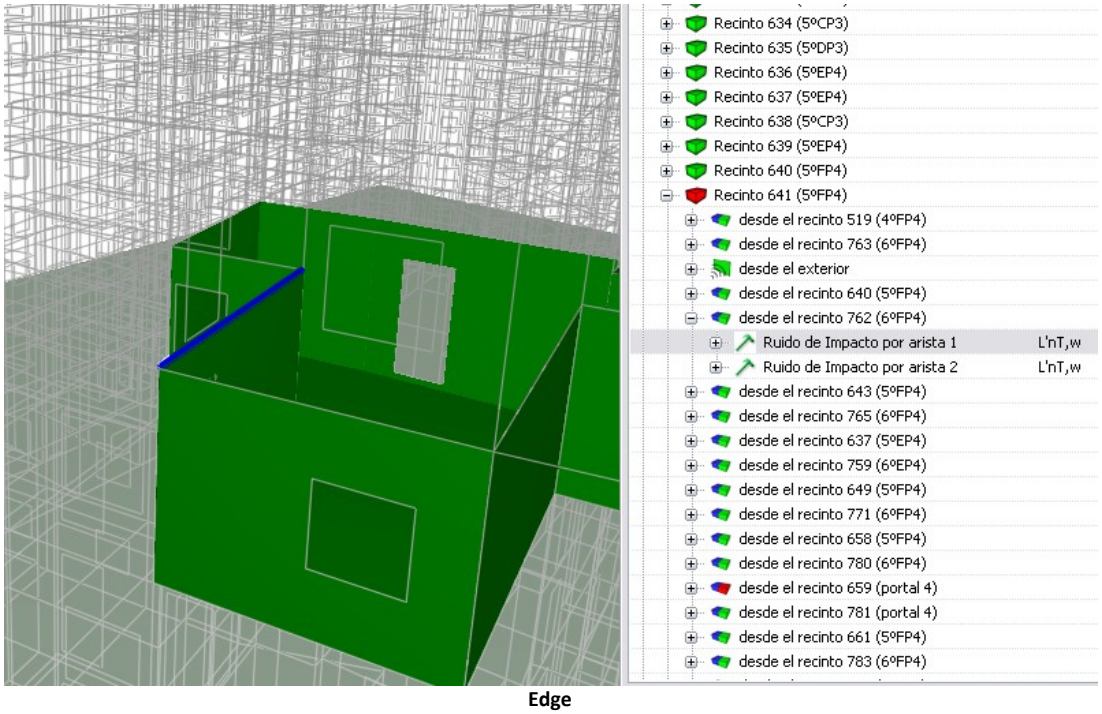


Transmission path


Recinto 634 (5ºCP3)
Recinto 635 (5ºDP3)
Recinto 636 (5ºEP4)
Recinto 637 (5ºEP4)
Recinto 638 (5ºCP3)
Recinto 639 (5ºEP4)
Recinto 640 (5ºFP4)
Recinto 641 (5ºFP4)
desde el recinto 519 (4ºFP4)
desde el recinto 763 (6ºFP4)
desde el exterior
desde el recinto 640 (5ºFP4)
desde el recinto 762 (6ºFP4)
Ruido de Impacto por arista 1 L'nT,w
Ruido de Impacto por arista 2 L'nT,w
desde el recinto 643 (5ºFP4)
desde el recinto 765 (6ºFP4)
desde el recinto 637 (5ºEP4)
desde el recinto 759 (6ºEP4)
desde el recinto 649 (5ºFP4)
desde el recinto 771 (6ºFP4)
desde el recinto 658 (5ºFP4)
desde el recinto 780 (6ºFP4)
desde el recinto 659 (portal 4)
desde el recinto 781 (portal 4)
desde el recinto 661 (5ºFP4)
desde el recinto 783 (6ºFP4)

Edge

11.2 Statistics

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Calculations are done.

But now we want to check the acoustic quality of the building. Since we have all the results, let us see how the acoustic values are distributed inside the building. Let us see how insulated is our building.

For that purpose just press the Statistics button and you will have a matrix where you can see graphically the distribution of those acoustic values.

You can select the **room type, with the number of rooms** that fulfill the requirements or not (Ok NOk), and the **requirement**, with the **number of calculations** belonging to that room type and value and their compliance.

It displays the **histogram** where each column contains the **number of calculations** (compliant/non-compliant couples of enclosures or façades) from which the acoustic insulation levels have been calculated.

Click, for instance, in a box inside the row "Habitable" with the column "Different unit" and you will have the statistics of all the insulation values between Habitable enclosures and enclosures in a different use unit.

Then you can also click in any bar of the histogram (green compliant range, red non. compliant range) and immediately all the enclosures with a encounter within that category are located in the 3D model of the building!

So, in the room type region only the rooms are computed. In the requirements region all the calculations are computed: one room has more than one calculation when it has more than one adjacent room.

Clicking on the top-right corner button, you print a report of the building statistics.

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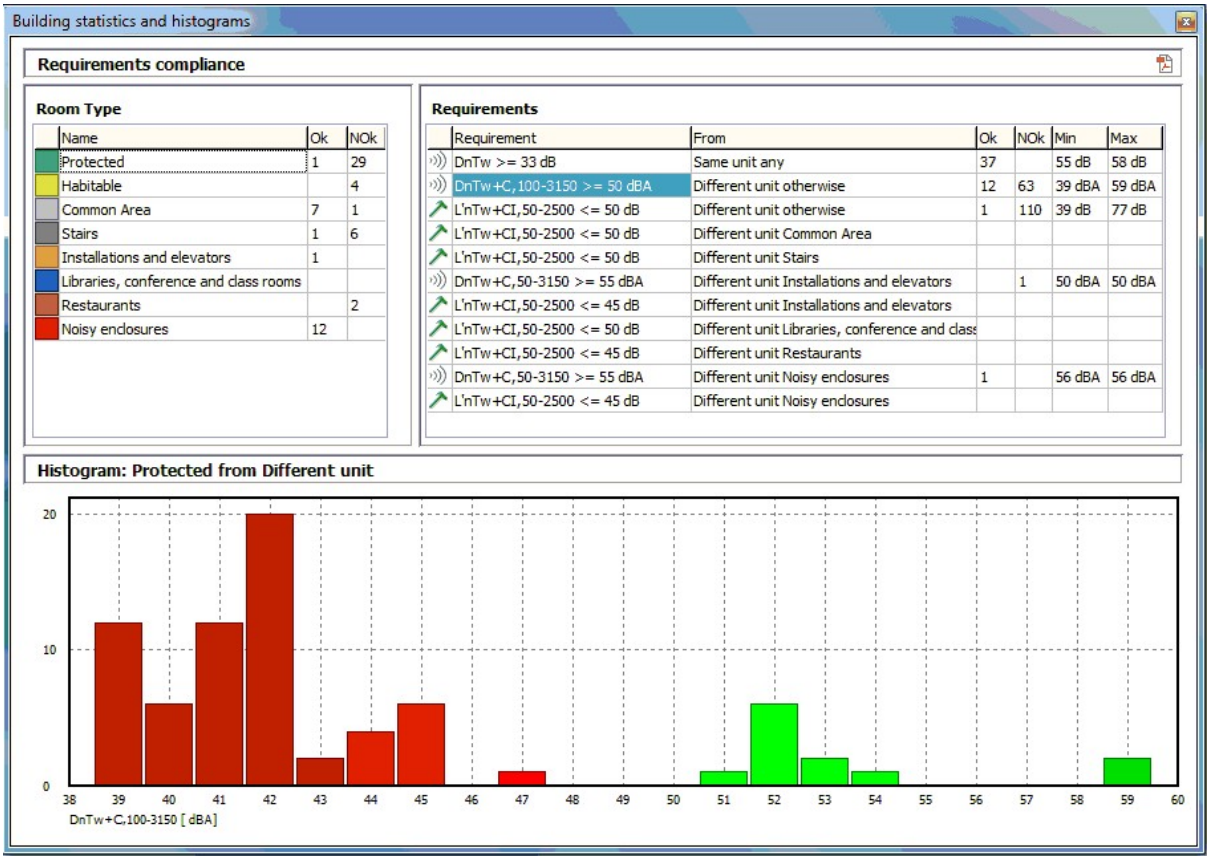
Building statistics and histograms
Requirements compliance
Room Type
Name Ok NOk
Protected 1 29
Habitable 4
Common Area 7 1
Stairs 1 6
Installations and elevators 1
Libraries, conference and class rooms
Restaurants 2
Noisy enclosures 12
Requirements
Requirement From Ok NOk Min Max
DnTw >= 33 dB Same unit any 37 55 dB 58 dB
DnTw+C,100-3150 >= 50 dBA Different unit otherwise 12 63 39 dBA 59 dBA
L'nTw+CI,50-2500 <= 50 dB Different unit otherwise 1 110 39 dB 77 dB
L'nTw+CI,50-2500 <= 50 dB Different unit Common Area
L'nTw+CI,50-2500 <= 50 dB Different unit Stairs
DnTw+C,50-3150 >= 55 dBA Different unit Installations and elevators 1 50 dBA 50 dBA
L'nTw+CI,50-2500 <= 45 dB Different unit Installations and elevators
L'nTw+CI,50-2500 <= 50 dB Different unit Libraries, conference and class
L'nTw+CI,50-2500 <= 45 dB Different unit Restaurants
DnTw+C,50-3150 >= 55 dBA Different unit Noisy enclosures 1 56 dBA 56 dBA
L'nTw+CI,50-2500 <= 45 dB Different unit Noisy enclosures
Histogram: Protected from Different unit
20
10
0
38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60
DnTw+C,100-3150 [dBA]

Statistics

11.3 Auralization

Now you can hear your building!

Press the Auralisation 3D button and load the 3D environment.

The blue room is the source and the green room is the receiver.

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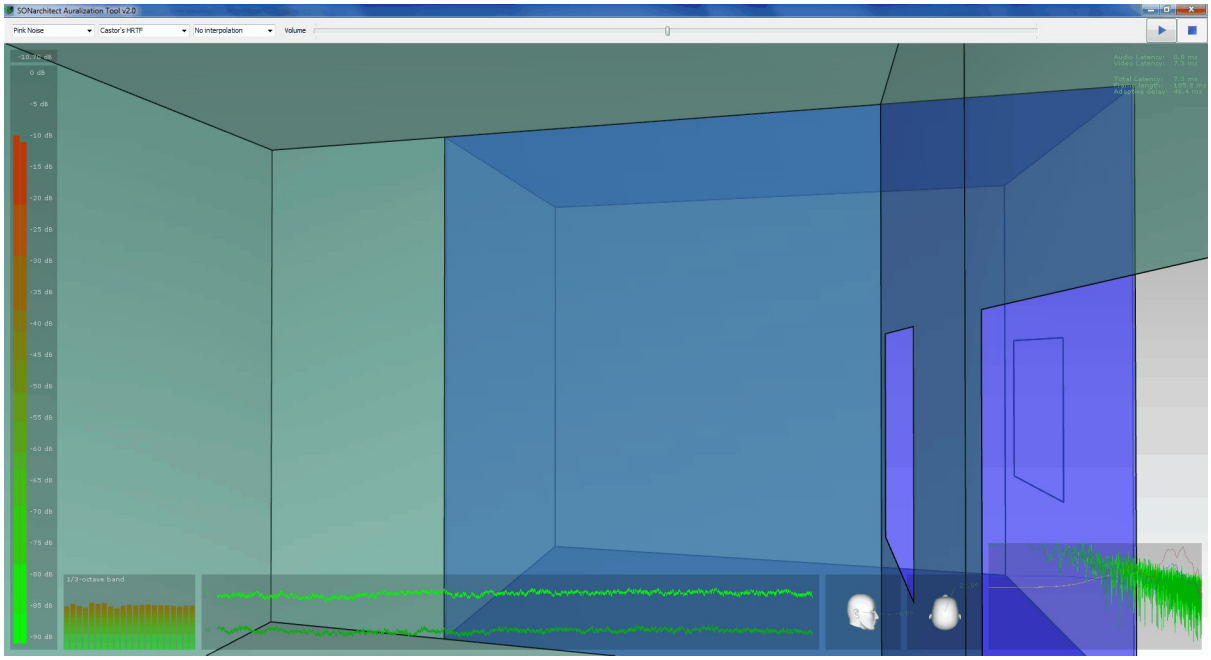

It's time to plug in your headphones.

Select a sound file from the built-in tracks or you can even load your own file. The source is placed on the source room (blue).

Select also a HRTF model within the 56 built-in models (our staff). Choose the one that matches your hearing sense.

Play, adjust the volume and listen it in the source room (for a better performance the use of a good pair of headphones is highly recommended). Then with the mouse (click and drag) and the arrow keys, just take a walk around. Navigate through the environment and feel the different noise levels.

11.4 Report

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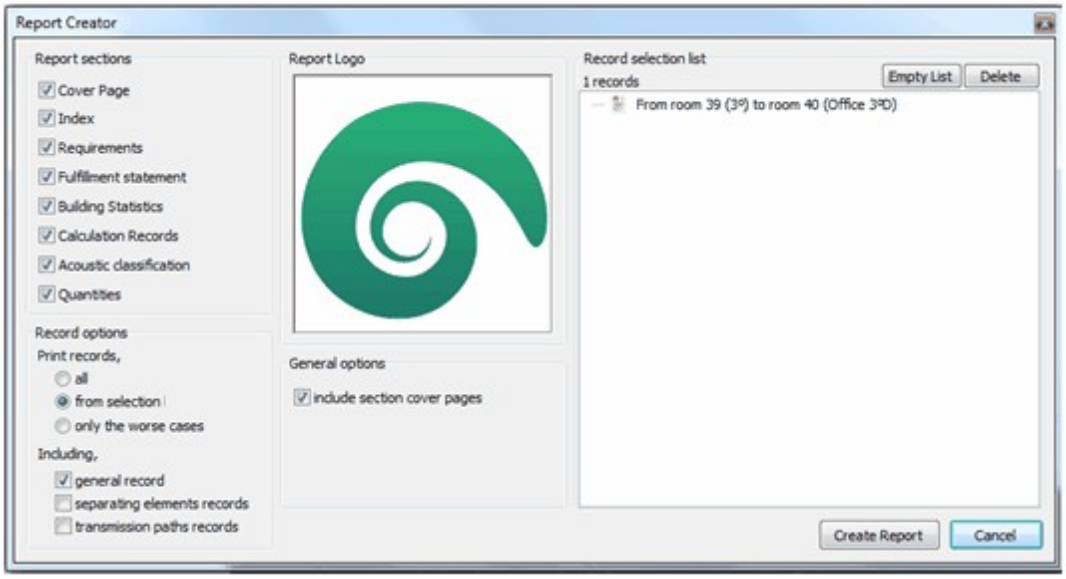
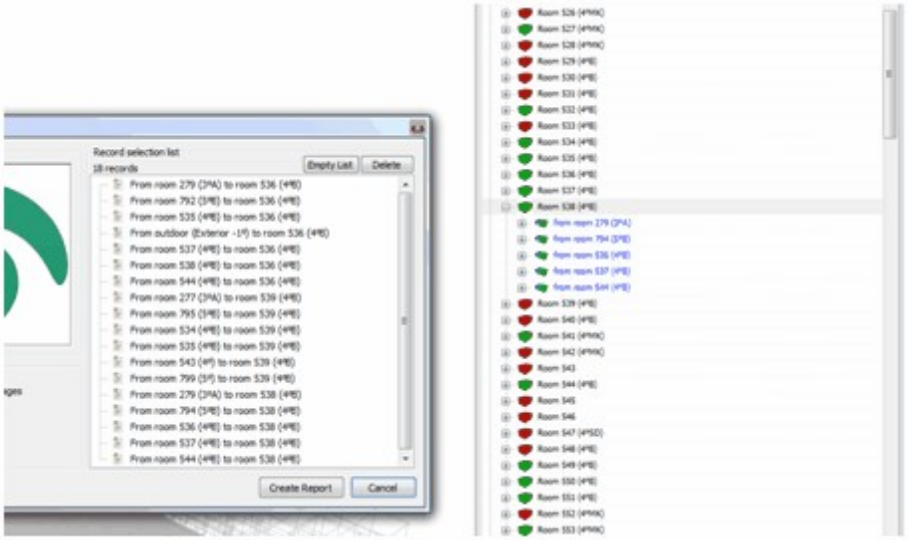
Since the purpose of projecting with SONarchitect is obtaining a document were all the calculations are justified, you can generate a customized PDF file. The user can decide the content of this report. In the dialog it is possible to choose the sections the user wants to add.



Report dialog

For an easier location and edition of the results included in the report, you can select them from the result tree.

Just press the icon in the record dialog or press the key ***[P]*** when selecting the desired result, it turns blue and it is automatically added to the reports list.



As you can see, there are several sections for including in the report.

© 2012 Sound of Numbers S.L.

- Cover page
- Index
- Requirements
- Fulfillment statement
- Building statistics
- Calculation records
- Acoustic classification
- Quantities

Click on the **Logo** and you will be able to load your own company logo for the report.

You can also choose the characteristics of the Records to include in the report.

Between any section you can also include a blank cover with its title, just checking "Include section cover pages" in General options.

11.4.1 Cover

When the cover checkbox is active, the first page of the report will be a customized cover that will contain the view of the building in the moment of generating the report.

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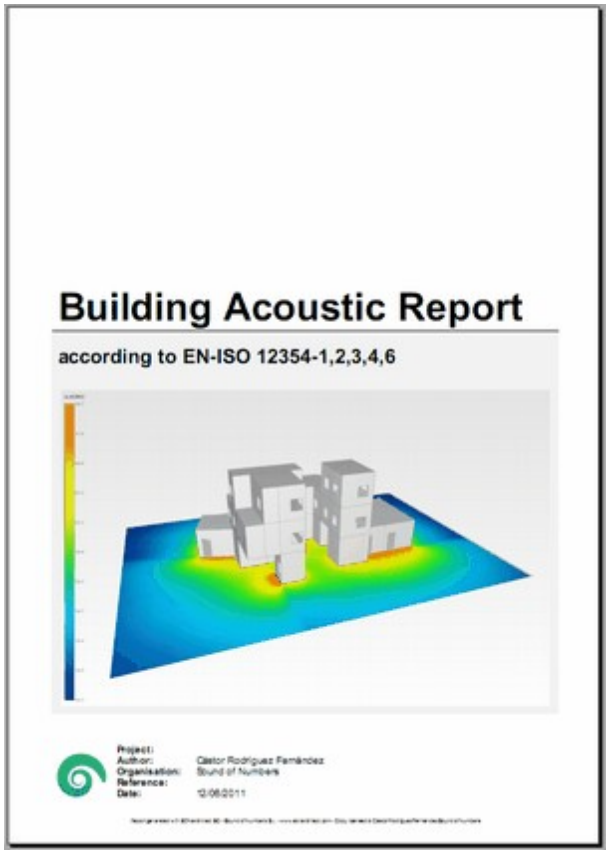

Cover

11.4.2 Requirements

You have entered the requirements for your project, based in the building code of your country or region. You can now add a summary of these limits in the report.

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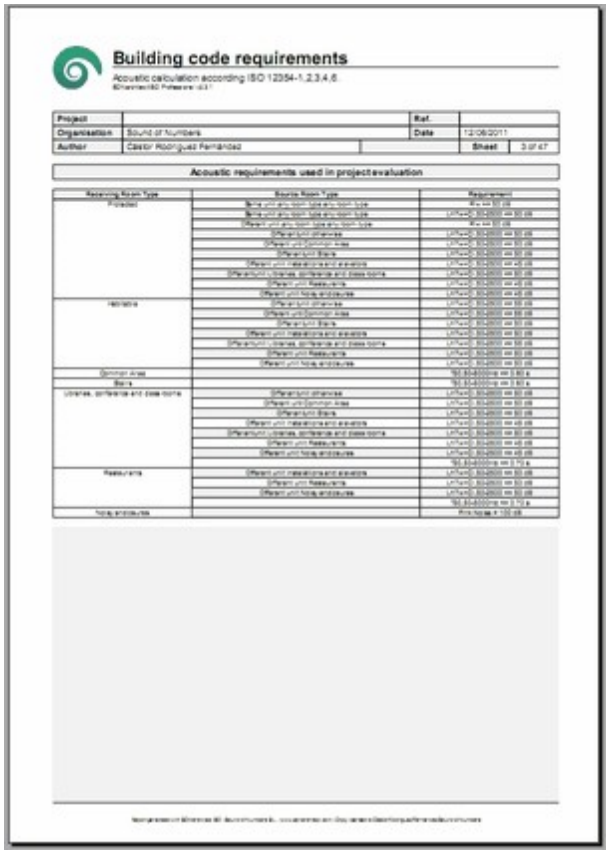

Building code requirements

Acoustic calculation according ISO 12354-1,2,3,4,6

Project		Ref.	
Organization	Sound of Numbers	Date	12/08/2011
Author	Cesar Rodriguez Fernandez	Sheet	3 of 47

Acoustic requirements used in project evaluation

Receiving Room Type	Source Room Type	Requirement
Private	Same unit any room type to room type	Rw >= 50 dB
	Same unit any room type to room type	L'nTw <= 30+20log V dB 50 dB
	Different unit any room type to room type	Rw >= 50 dB
	Different unit otherwise	L'nTw <= 30+20log V dB 50 dB
	Different unit Common Area	L'nTw <= 30+20log V dB 50 dB
	Different unit Stairs	L'nTw <= 30+20log V dB 50 dB
	Different unit Installations and elevators	L'nTw <= 30+20log V dB 45 dB
	Different unit Libraries, conference and class rooms	L'nTw <= 30+20log V dB 50 dB
	Different unit Restaurants	L'nTw <= 30+20log V dB 45 dB
	Different unit Noisy enclosures	L'nTw <= 30+20log V dB 45 dB
Hotrooms	Different unit otherwise	L'nTw <= 30+20log V dB 50 dB
	Different unit Common Area	L'nTw <= 30+20log V dB 50 dB
	Different unit Stairs	L'nTw <= 30+20log V dB 50 dB
	Different unit Installations and elevators	L'nTw <= 30+20log V dB 50 dB
	Different unit Libraries, conference and class rooms	L'nTw <= 30+20log V dB 50 dB
	Different unit Restaurants	L'nTw <= 30+20log V dB 50 dB
	Different unit Noisy enclosures	L'nTw <= 30+20log V dB 50 dB
Common Area		Tr<0.6s(500Hz-4kHz) min 0.80 s
Stairs		Tr<0.6s(500Hz-4kHz) min 0.80 s
Libraries, conference and class rooms	Different unit otherwise	L'nTw <= 30+20log V dB 50 dB
	Different unit Common Area	L'nTw <= 30+20log V dB 50 dB
	Different unit Stairs	L'nTw <= 30+20log V dB 50 dB
	Different unit Installations and elevators	L'nTw <= 30+20log V dB 45 dB
	Different unit Libraries, conference and class rooms	L'nTw <= 30+20log V dB 50 dB
	Different unit Restaurants	L'nTw <= 30+20log V dB 45 dB
	Different unit Noisy enclosures	L'nTw <= 30+20log V dB 45 dB
		Tr<0.6s(500Hz-4kHz) min 0.70 s
Restaurants	Different unit Installations and elevators	L'nTw <= 30+20log V dB 50 dB
	Different unit Restaurants	L'nTw <= 30+20log V dB 50 dB
	Different unit Noisy enclosures	L'nTw <= 30+20log V dB 50 dB
		Tr<0.6s(500Hz-4kHz) min 0.70 s
Noisy enclosures		Prohibited + 100 dB

Requirements

11.4.3 Compliance statement

The first and most important information in the project is its fulfillment with the requirements.

SONarchitect summarizes the compliance in a diagnosis sheet.

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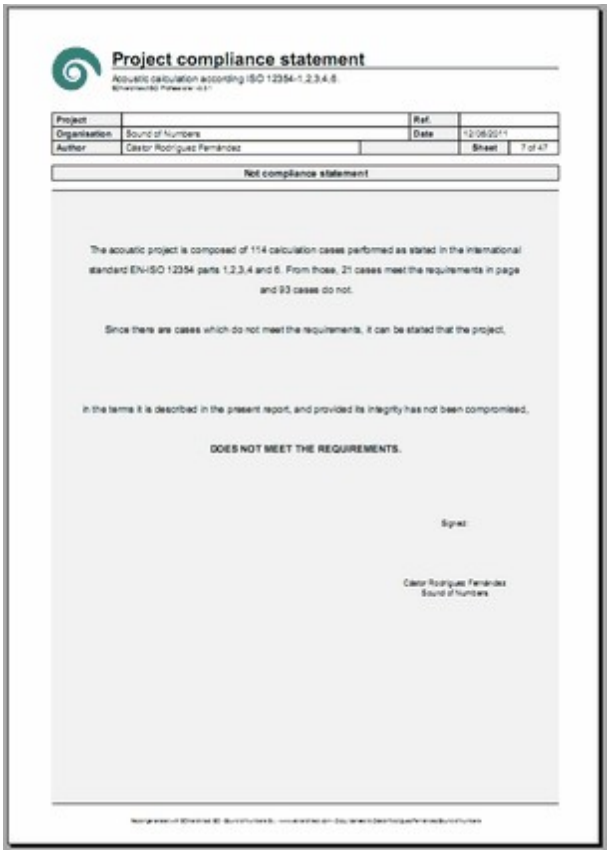

Project compliance statement

Acoustic calculation according ISO 12354-1,2,3,4,6

Project		Ref.	
Organisation	Sound of Numbers	Date	12/06/2011
Author	Cesar Rodriguez Fernandez	Sheet	7 of 47

Not compliance statement

The acoustic project is composed of 114 calculation cases performed as stated in the international standard EN-ISO 12354 parts 1,2,3,4 and 6. From those, 21 cases meet the requirements in page and 93 cases do not.

Since there are cases which do not meet the requirements, it can be stated that the project,

in the terms it is described in the present report, and provided its integrity has not been compromised,

DOES NOT MEET THE REQUIREMENTS.

Signed:

Cesar Rodriguez Fernandez
Sound of Numbers

Fulfillment sheet

11.4.4 Building statistics

SONarchitect computes all the sound insulation values in the entire building. So, we have all the data for presenting the general statistics of the whole building.

First, we can classify the rooms in types describing its compliance:

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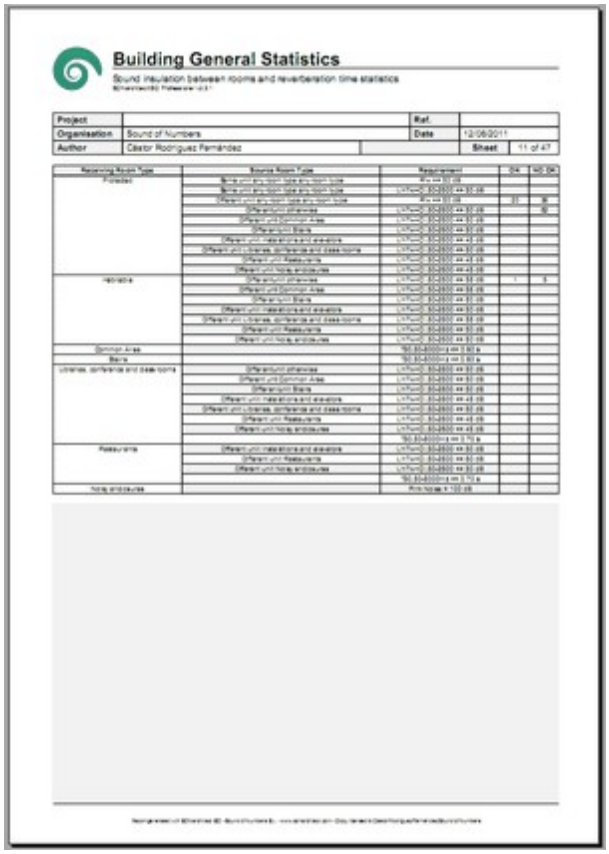

Building General Statistics

Sound insulation between rooms and reverberation time statistics

Project		Ref.	
Organisation	Sound of Numbers	Date	12/06/2011
Author	Castor Rodriguez Fernández	Sheet	11 of 47

Building statistics

And we add some histograms afterwards, describing the statistical distribuition of the different analyzed sound insulation values:

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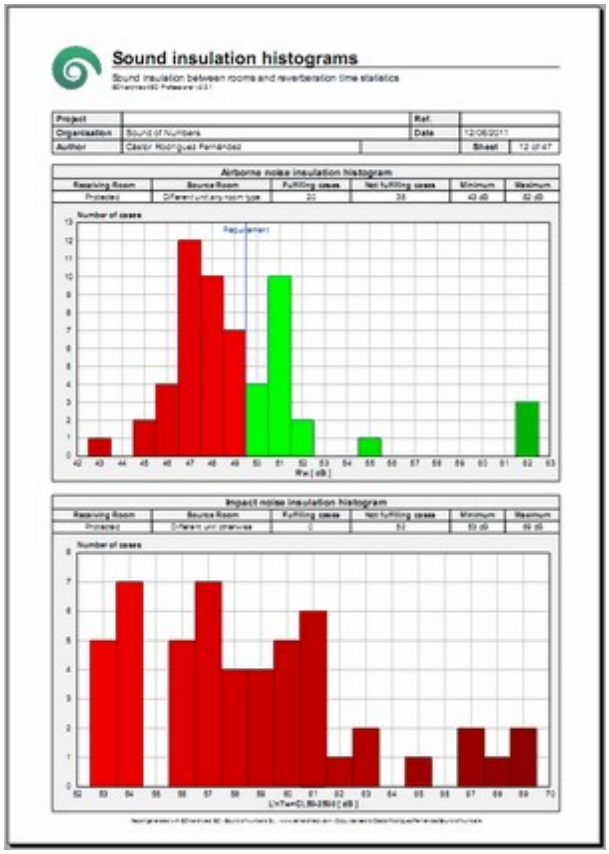

Histograms

11.4.5 Records

With the record options you can manage the way the results are disposed in the reports.

First of all you can select how many reports you wish to print. You can print all of them, just the selection you have done pressing [P] when being over the desired record, or just the worst cases. Check the one you prefer.

It is not evident to select the worst cases from the beginning. That is why SONarchitect selects automatically the minimum and worst cases in order to justify the compliance of the project.

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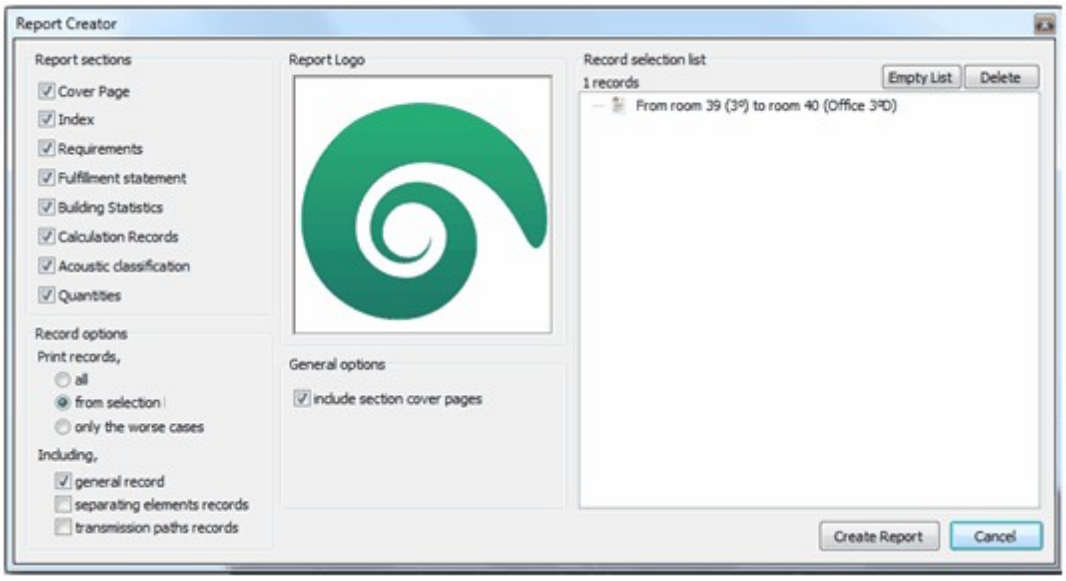

Report dialog

Now you can select whether printing a general record...

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Sound insulation according to EN-ISO 12354

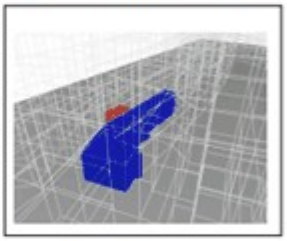
Airborne and impact sound insulation calculation record

SONarchitect EN ISO 12354

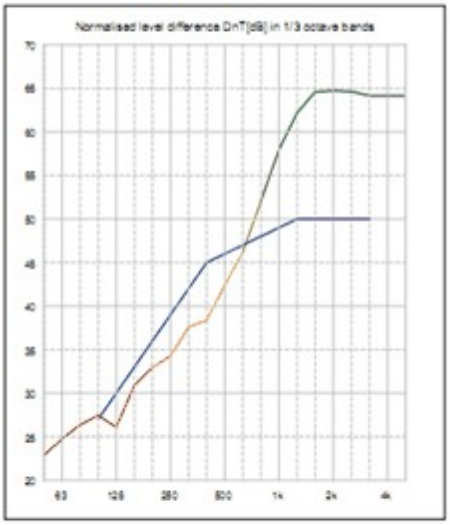
Project	Demo			Ref.	Demo
Company	SON (Sound of Numbers)			Data	17/12/2009
Author	John William Strutt	Record	1 of 1	Sheet	26

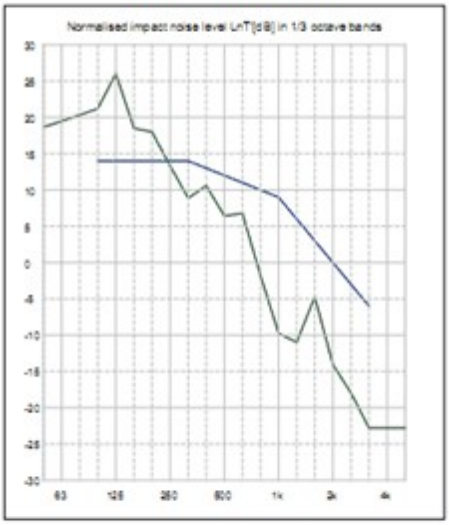
Source room					
Name	Portal 3				
Unit					
Type	Common Area				
Floor	0	ID number	19	Volume	78.12 m³

Receiving room					
Name					
Unit	BP3				
Type	Protected				
Floor	0	ID number	35	Volume	10.48 m³



Airborne sound insulation	Impact sound insulation





Single-number quantity (ISO 717-1:1996)	
Frequency range [Hz]	DnT,w(C;Ctr)
100 - 3125 Hz	46(-1;-6)
50 - 3125 Hz	46(-2;-8)
100 - 5000 Hz	46(7;-2)
50 - 5000 Hz	46(0;-8)

Single-number quantity (ISO 717-2:1996)	
Frequency range [Hz]	LnT,w'(CI)
100 - 2500 Hz	12(2)
50 - 2500 Hz	12(3)

Parameter	Calculation		Requirement
DnT,w+C,50-3	44 dBA	<	50 dBA

DOES NOT MEET THE REQUIREMENT

Parameter	Calculation		Requirement
L'nT,w+CI,100	14 dB	<	50 dB

MEETS THE REQUIREMENT

Report generated with SONarchitect EN ISO 12354 - Sound of Numbers S.L. - www.soundofnumbers.com

General report

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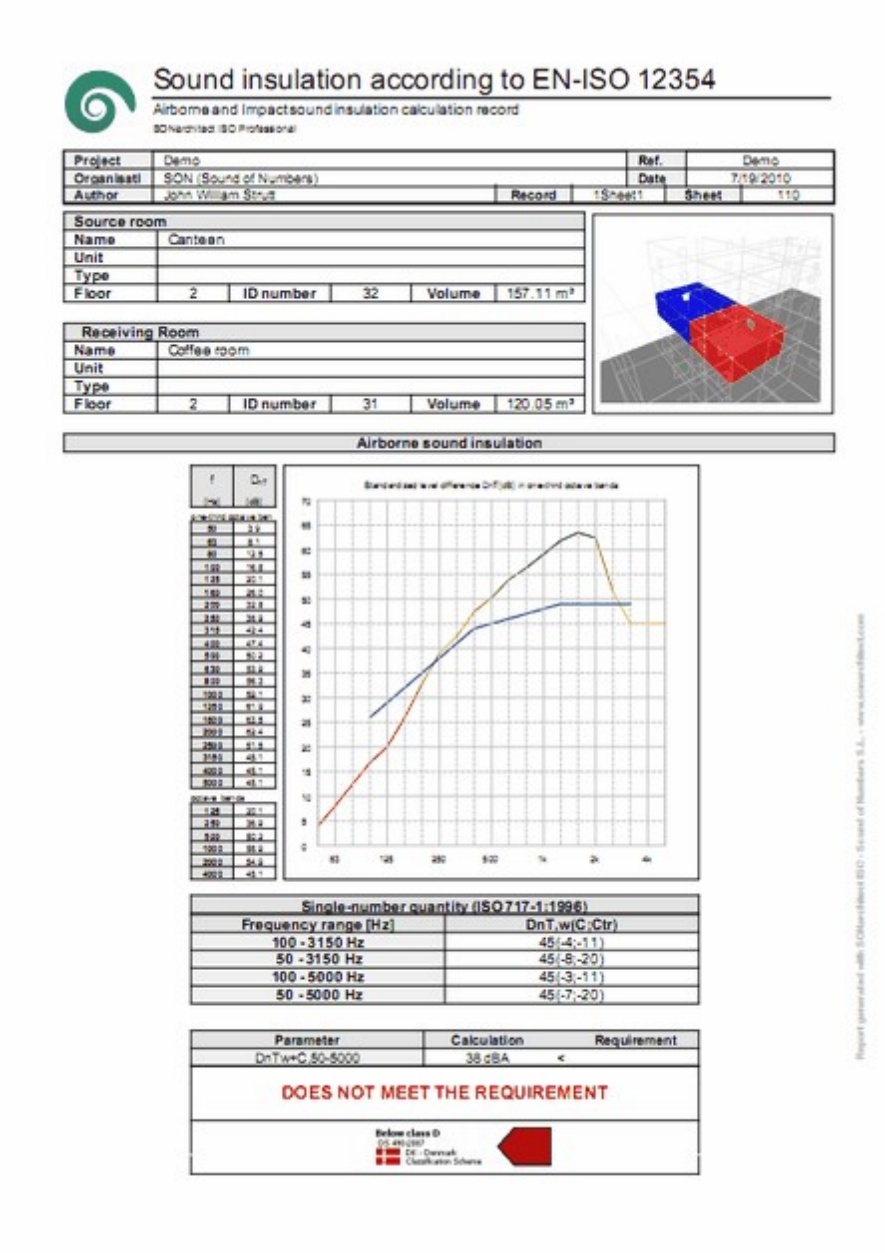

Sound insulation according to EN-ISO 12354

Airborne and Impactsound insulation calculation record

Project	Demo			Ref.	Demo
Organisati	SON (Sound of Numbers)			Date	7/19/2010
Author	John William Strutt		Record 1Sheet1	Sheet	110

Source room					
Name	Canteen				
Unit					
Type					
Floor	2	ID number	32	Volume	157.11 m³

Receiving Room					
Name	Coffee room				
Unit					
Type					
Floor	2	ID number	31	Volume	120.05 m³

Airborne sound insulation

Single-number quantity (ISO 717-1:1996)	
Frequency range [Hz]	DnT,w(C;Ctr)
100 - 3150 Hz	45(-4;-11)
50 - 3150 Hz	45(-8;-20)
100 - 5000 Hz	45(-3;-11)
50 - 5000 Hz	45(-7;-20)

Parameter	Calculation	Requirement
DnTw+C,50-5000	38 dBA	<

DOES NOT MEET THE REQUIREMENT

Below class D

General report with classification

...adding all the implied elements in that record...

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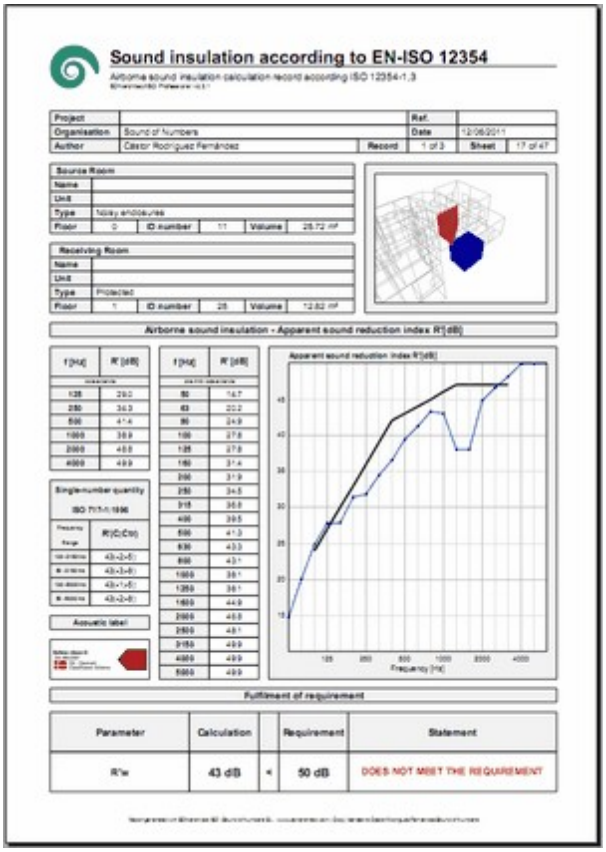

Sound insulation according to EN-ISO 12354

Airborne sound insulation calculation record according ISO 12354-1,3

Project				Ref.	
Organisation	Sound of Numbers			Date	12/06/2011
Author	César Rodríguez Fernández		Record	1 of 3	Sheet 17 of 47

Source Room					
Name					
Unit					
Type	Noisy enclosures				
Floor	0	ID number	11	Volume	28.72 m³

Receiving Room					
Name					
Unit					
Type	Protected				
Floor	1	ID number	25	Volume	12.82 m³

Airborne sound insulation - Apparent sound reduction index R'[dB]

f [Hz]	R' [dB]
125	29.0
250	36.3
500	41.4
1000	38.9
2000	48.8
4000	49.9

f [Hz]	R' [dB]
50	14.7
63	20.2
80	24.9
100	27.8
125	27.8
160	31.4
200	31.9
250	34.5
315	36.8
400	39.5
500	41.3
630	43.3
800	43.1
1000	38.1
1250	38.1
1600	44.9
2000	48.8
2500	48.1
3150	49.9
4000	49.9
5000	49.9

Single-number quantity

ISO 717-1:1996

Frequency Range	R'(C;Ctr)
100-3150 Hz	43(-2;-5)
50-5000 Hz	43(-3;-8)
100-5000 Hz	43(-1;-5)
50-3150 Hz	43(-2;-8)

Acoustic label

Fulfilment of requirement

Parameter	Calculation		Requirement	Statement
R'w	43 dB	<	50 dB	DOES NOT MEET THE REQUIREMENT

…or even adding all the transmission paths!

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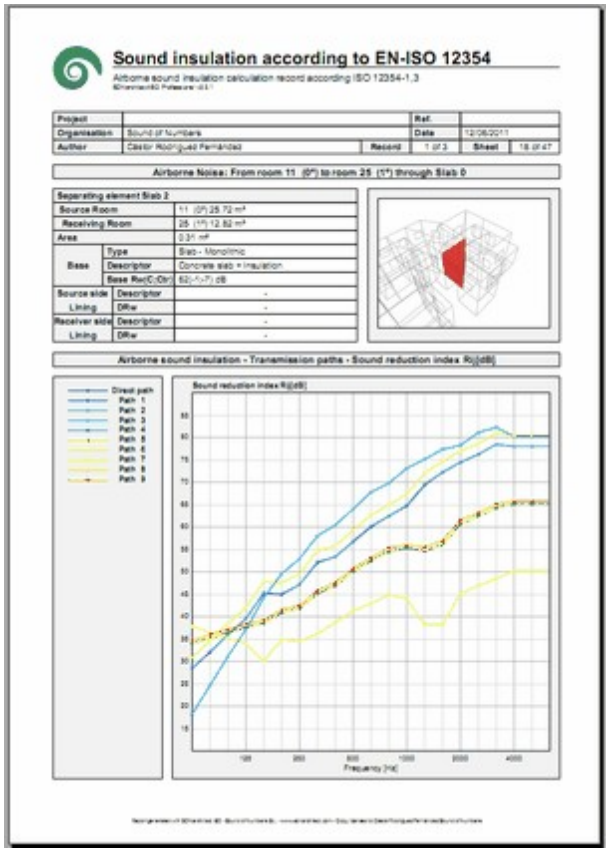

Sound insulation according to EN-ISO 12354

Airborne sound insulation calculation record according ISO 12354-1,3

Project			Ref.		
Organization	Sound of Numbers		Date	12/06/2011	
Author	Cesar Rodriguez Fernandez	Record	1 of 3	Sheet	18 of 47

Airborne Noise: From room 11 (0°) to room 25 (1°) through Slab 0

Separating element Slab 2		
Source Room		11 (0°) 25.72 m²
Receiving Room		25 (1°) 12.82 m²
Area		0.31 m²
Base	Type	Slab - Monolithic
	Descriptor	Concrete slab + insulation
	Base Rw(C;Ctr)	62(-1;-7) dB
Source side Lining	Descriptor	-
	DRw	-
Receiver side Lining	Descriptor	-
	DRw	-

Airborne sound insulation - Transmission paths - Sound reduction index Ri [dB]

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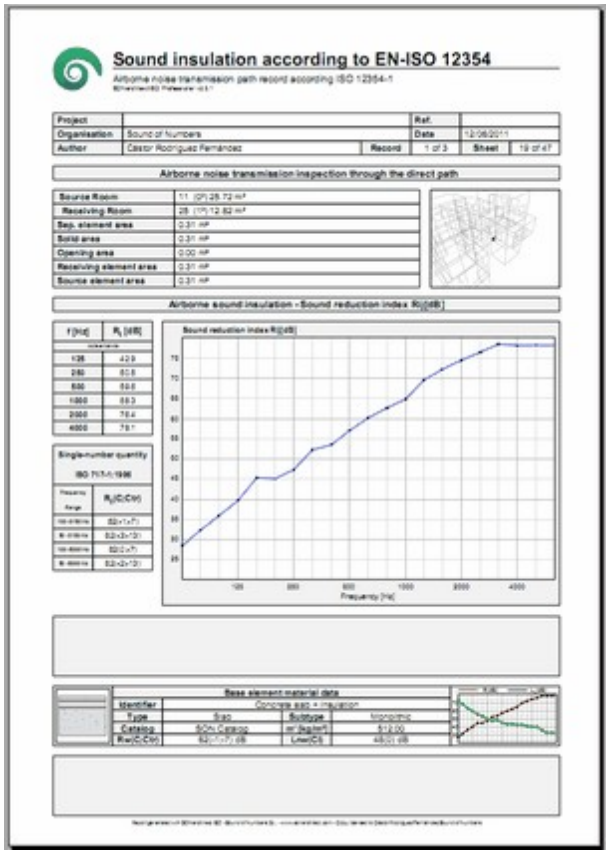
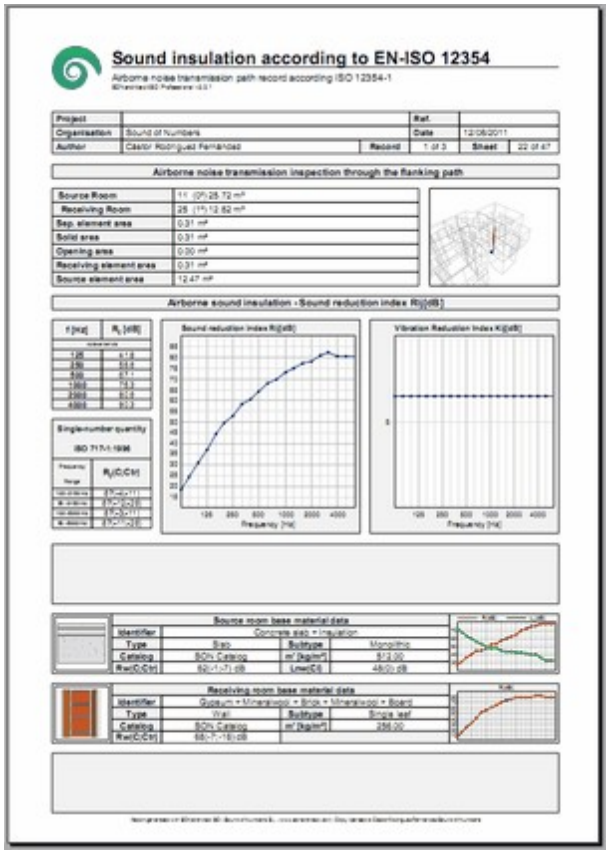

Sound insulation according to EN-ISO 12354
Airborne noise transmission path record according ISO 12354-1
Project
Ref.
Organisation
Sound of Numbers
Date
Author
Cesar Rodriguez Fernandez
Record
1 of 3
Sheet
Airborne noise transmission inspection through the direct path
Source Room
Receiving Room
Sep. element area
Solid area
Opening area
Receiving element area
Source element area
Airborne sound insulation - Sound reduction index R(dB)
Single-number quantity
Sound reduction index R(dB)
Frequency [Hz]
Base element material data
Identifier
Concrete sep. + insulation
Type
Sep.
Subtype
Monolithic
Catalog
Rw(C;Ctr)


Sound insulation according to EN-ISO 12354
Airborne noise transmission path record according ISO 12354-1
Airborne noise transmission inspection through the flanking path
Source Room
Receiving Room
Sep. element area
Solid area
Opening area
Receiving element area
Source element area
Airborne sound insulation - Sound reduction index R(dB)
Source room base material data
Receiving room base material data

11.4.6 Acoustic quality

Beyond the fulfillment, SONarchitect allows to clasify the sound insulation of each enclosure in the quality levels (A/B/C/D/E) described in the European countries standards (Denmark DS 490:2001, Norwey NS 8175:2005, Sweden SS 25267:2004, Finland SFS 5907:2004, Iceland IST 45:2003, Germany VDI 4100:1994, France Guide Qualitel:2000, Netherlands NEN 1070:1999, Lithuania STR 2.01.07:2003). And, since SONarchitect has the result of every enclosure inside the building, in can classify the entire building regarding the maximum insulation value, the minimum, the average...

You can see this classification in the General record or you can have the entire building histograms.

Just active the checkbox for this purpose in the Report dialog, and the report will include a resume of the acoustic quality of the building. That is represented by several histograms.

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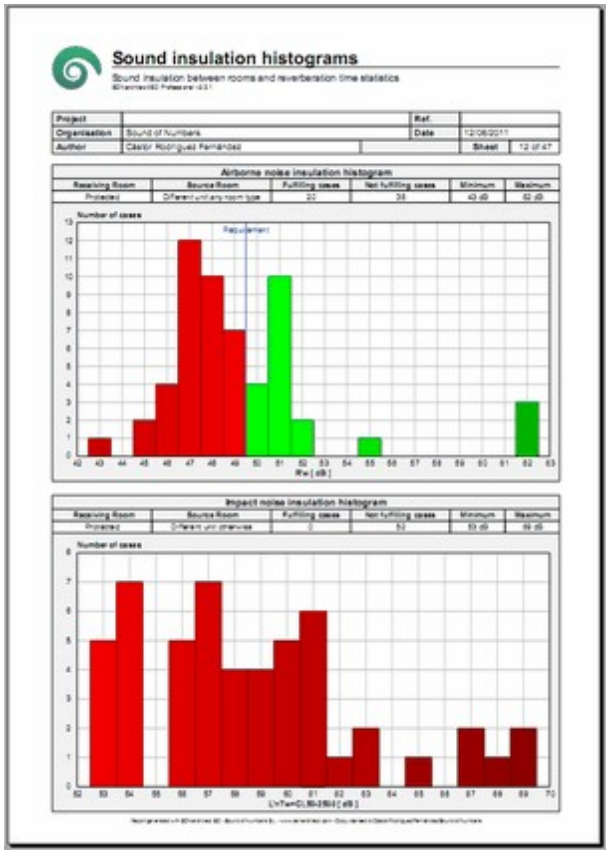

Histograms

11.4.7 Quantities

Finally, the last data in the report is the quantities description.

It is very useful to have a resume of all the materials used in the project with their characteristics and measurements, since the construction factor is very important for the acoustic performance of the building.

The building director will thank you.

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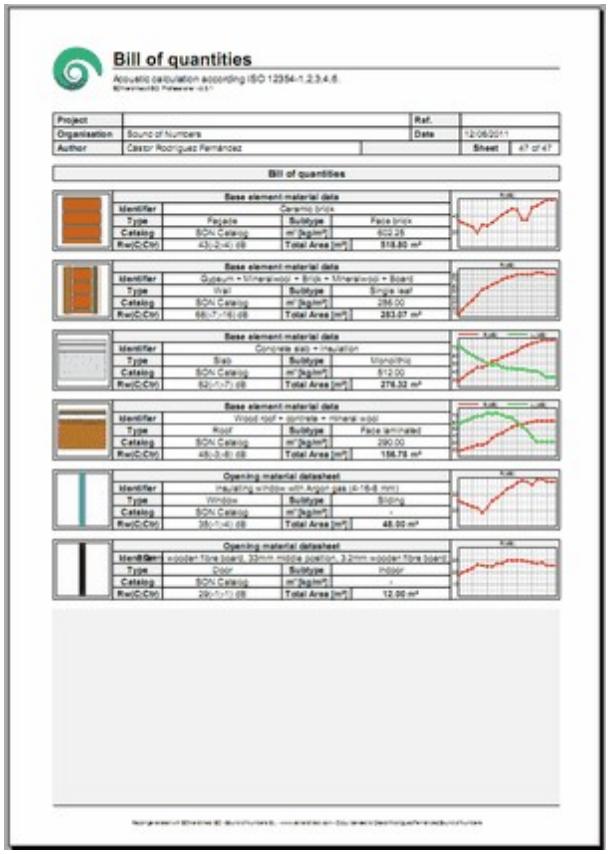

Bill of quantities

Acoustic calculation according ISO 12354-1,2,3,4,6

Project		Ref.	
Organisation	Sound of Numbers	Date	12/06/2011
Author	Cesar Rodriguez Fernandez	Sheet	47 of 47

Bill of quantities

Base element material data			
Identifier	Ceramic brick		
Type	Fachada	Subtype	Face brick
Catalog	BDN Catalog	m' [kg/m²]	602.28
Rw(C;Ctr)	43(-2;-4) dB	Total Area [m²]	518.80 m²

Base element material data			
Identifier	Gypsum + Mineralwool + Brick + Mineralwool + Board		
Type	Wall	Subtype	Single leaf
Catalog	BDN Catalog	m' [kg/m²]	286.00
Rw(C;Ctr)	68(-7;-14) dB	Total Area [m²]	283.07 m²

Base element material data			
Identifier	Concrete slab + insulation		
Type	Slab	Subtype	Monolithic
Catalog	BDN Catalog	m' [kg/m²]	512.00
Rw(C;Ctr)	62(-1;-7) dB	Total Area [m²]	276.32 m²

Base element material data			
Identifier	Wood roof + concrete + mineral wool		
Type	Roof	Subtype	Pale laminated
Catalog	BDN Catalog	m' [kg/m²]	290.00
Rw(C;Ctr)	48(-3;-8) dB	Total Area [m²]	156.75 m²

Opening material datasheet			
Identifier	Insulating window with Argon gas (4-16-6 mm)		
Type	Window	Subtype	Sliding
Catalog	BDN Catalog	m' [kg/m²]	
Rw(C;Ctr)	35(-1;-4) dB	Total Area [m²]	48.00 m²

Opening material datasheet			
Identifier	wooden fibre board, 33mm middle position, 3.2mm wooden fibre board		
Type	Door	Subtype	Indoor
Catalog	BDN Catalog	m' [kg/m²]	
Rw(C;Ctr)	29(-1;-1) dB	Total Area [m²]	12.00 m²

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Chapter XII

Keys

12 Keys

Here we summarize all the shortcut keys used in SONarchitect ISO.

Key	Functionality
L	Draw line tool
S	Selection tool
V	2D Virtual Slab
I	Select all the interior walls
F	Select the entire façade of the building
C	Select the complementary linings of a set of linings
G	Go to materials assignment and select the element implied on the selected transmission path.
O	Insert an object with a certain volume for Reverberation time control
R	Rotate the reference line for perpendicular drawing
X	Perpendicular guide
Shift	Multiselection Local ortho Separate Floors in 3D (together with scroll wheel)
Control	Pan Global ortho
Enter	Assign material
Delete	Delete material assignment
Spacebar	Lock line for perpendicular with dimensions.
Esc	Unselect lines Closes windows

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Chapter XIII

SQL Quick Install

13 SQL Quick Install

Microsoft SQL Server 2008 R2

Quick Installation Guide

for

13.1 System Requirements

Before installing Microsoft SQL Server Express 2008, the server machine must have the next configuration and software:

- **Windows XP Service Pack 2:** This installation procedure was tested on this operating system. For installations in other operating systems, please visit Microsoft SQL Server Solution Center (http://support.microsoft.com/ph/2855).
- **Windows Installer 4.5:** http://www.microsoft.com/downloads/details.aspx?FamilyID=5a58b56f-60b6-4412-95b9-54d056d6f9f4&displaylang=en
- **.Net Framework 3.5 SP1:** http://www.microsoft.com/downloads/details.aspx?FamilyId=333325FD-AE52-4E35-B531-508D977D32A6&displaylang=es
- **Windows PowerShell 1.**0: http://www.microsoft.com/windowsserver2003/technologies/management/powershell/download.mspx

13.2 Installing Microsoft SQL Server Express 2008 R2

Download the Microsoft SQL Server 2008 R2 Express with Management Tools from http://www.microsoft.com/downloads/details.aspx?FamilyID=967225eb-207b-4950-91df-eeb5f35a80ee&displaylang=en

The SQL Server Installation Wizard installs the following components:

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- Database Engine
- Analysis Services
- Reporting Services
- Integration Services
- Replication
- Management tools
- Connectivity components
- Sample databases, samples, and SQL Server Books Online

The installation follows the next steps:

1. Double-click on the downloaded executable. Click OK to install the prerequisites: *.NET Framework 3.5 SP1* and *Windows Installer 4.5* are required.

2. When the prerequisites are installed, the Installation Wizard runs the *SQL Server Installation Center*. To create a new installation, click *New Installation or Add Features to an Existing Installation*.

3. The *System Configuration Checker* runs a discovery operation on your computer. To continue, click OK. If Setup detects SQL Server 2008 on the machine, you will see a warning about the automatic upgrade of shared components to SQL Server 2008 R2.

4. On the *Language Selection* page, you can specify the language for your instance of SQL Server if you are installing on a localized operating system and the installation media includes language packs for both English and the language corresponding to the operating system.

5. On the *Product Key* page, select an option button to indicate that you are installing a free edition of SQL Server (Express edition).

6. On the License Terms page, read the license agreement, and then select the check box to accept the license terms and conditions. To help improve SQL Server, you can also enable the feature usage option and send reports to Microsoft.

7. The System Configuration Checker verifies the system state of your computer before Setup continues.

8. On the *Feature Role* page, select *SQL Server Feature Installation*.

9. On the *Feature Selection* page, select the components for your installation. By default select all the features.

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10. On the *Instance Configuration* page, specify whether to install a default instance or a named instance. By default select first choice. For a default instance, the instance name and instance ID would be *MSSQLSERVER*. The default instance root directory is *C:\Program Files\Microsoft SQL Server\100*.

11. The *Disk Space Requirements* page calculates the required disk space for the features that you specify.

12. On the Server Configuration — Service Accounts page, specify login accounts for SQL Server services. You can assign the same login account to all SQL Server services, or you can configure each service account individually. You can also specify whether services start automatically, are started manually, or are disabled. In the test installation, a unique service was created, configured to start automatically with the system startup. Provide credentials in the fields at the bottom of the page. For security purposes, do not use a blank password.

13. Use the *Database Engine Configuration - Account Provisioning* page to specify:

    § *Security Mode:* Select Windows Authentication or Mixed Mode Authentication. If you select Mixed Mode Authentication, you must provide a password for the built-in SQL Server system administrator account (*sa* account).

    § *SQL Server Administrators:* You must specify at least one system administrator. To add the account under which SQL Server Setup is running, click Add Current User. To add or remove accounts from the list of system administrators, click Add or Remove, and then edit the list of users, groups, or computers that will have administrator privileges for the instance of SQL Server.

14. Use the *Database Engine Configuration - Data Directories* page to specify nondefault installation directories. To install to default directories, click Next.

15. The *System Configuration Checker* will run one more set of rules to validate your computer configuration with the SQL Server features that you have specified.

16. The *Ready to Install* page shows a tree view of installation options that were specified during Setup. To continue, click Install.

13.3 Configuring the SQL Server Instance

The configuration tools shortcuts are located at *Start -> All Programs -> Microsoft SQL Server 2008 R2.*

In this folder the *Configuration Tools* are located: the *SQL Server Installation Center* and the *SQL Server Configuration Manager*.

Using the *SQL Server Configuration Manager*, the services, the network configuration and the client can be configured.

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1. Execute the *SQL Server Configuration Manager*.
2. Select *SQL Server Services* on the left panel.
3. On the right panel appears a list of services and their status. Select the SQL Server service (MSSQLSERVER) and double-click.
4. On the new window, the service can be configured. Select the *Service* tab and set *Start Mode* to *Automatic*.
5. Select *SQL Server Network Configuration -> Protocols for MSSQLSERVER* on the left panel.
6. On the right panel appears the available protocols and their status. Enable TCP/IP double-clicking on it and setting the correct parameters for your network configuration.
7. Select *SQL Native Client 10.0 Configuration -> Client Protocols* on the left panel.
8. On the right panel appears the available protocols and their status. Enable TCP/IP as in step 6.

Using the *SQL Server Installation Center,* operations such as new instances installation, maintenance, repairing or removing tasks can be performed.

In the same folder is located the *SQL Server Management Studio*, a GUI application to configure easily the SQL Server.

1. Execute the *SQL Server Management Studio*.
2. Set the server type, name and authentication method, and if needed, the user and the password. Click the *Connect* button.
3. If the connection is successful, on the left panel called *Object Explorer* appears a selectable tree with the following sections: Databases, Security, Server Objects, Replication and Management.
4. On the *Databases* category, a list of available databases is shown. Left click on *Databases* and select *New Database…* to create a new one.
5. On the *Security* category, new users can be created (*Logins*), new server roles and credentials. To create a new user, right click on *Logins,* set name and password, and grant access to the database.

13.4 Setting up the database

The database *isov2* used remotely by SONArchitect must be created and initialized manually. For this purpose the file *isov2.sql* is supplied (into the SONarchitect pendrive). This file is a SQL script which creates and sets up the remote database. To execute this script follow the next steps in the *SQL Server Management Studio:*

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1. Edit isov2.qql and change the path to your current system.

2. Select *File -> New -> Query with Current connection* (or press Ctrl+N). On the right panel appears a text editor where a SQL script can be edited.

3. Open the SQL script *isov2.sql* selecting *File -> Open -> File…* and selecting the desired script. The source code of the script appears in the editor.

4. Select *Query -> Execute* (or press F5 or the button *Execute* of the main toolbar). The SQL script is executed and the database is created.

At this point the SQL server and the database are available to be used.

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Chapter XIV

FAQ

14 FAQ

Here we are answering some common questions about SONarchitect ISO.

14.1 Why SONarchitect does not allow to draw what I want?

SONarchitect is not a drawing tool. SONarchitect is a acoustic software for helping you in the acoustic desing of your projects. With this purpose, SONarchitect continuously overviews your drawing and corrects automatically any situation that might unnecessary complicate the acoustic analysis of the building. The engineer that uses SONarchitect must be always aware that, for the UNE ISO 12354 computation method, is not only unnecessary to draw an exact copy of the building plans but also counterproductive. It is necessary to simplify the plans of the building until achieve a simple model that has complete acoustic sense. Thus, for instance, SONarchitect does not provide tools for drawing arcs or circumferences because the norm does not reflect curve walls. That is why it is necessary to approximate any curve of the plan to a polyline. Actually, this always happens while working with computers, for example AutoCAD. To get a visual result as much similar to a curve as possible is the purpose in AutoCAD, in the other hand SONarchitect and the ISO 12354 should approximate the surface with the minimum number of segments, for avoiding the insertion of several walls in the model with a insignificant length that only would make a more complex analysis of the results or any modification.

SONarchitect can compute the acoustical behaviour of thousands of encounters in seconds. But this is not the problem but what the engineer would do when dealing with hundreds of microwalls for checking or modifying with low fidelity results because of their dimensions. Any curved wall with three or four segments gives enough precision to the calculation (bigger than required by the norm) without complicating the result tree and its handling.

As well as with the curves, SONarchitect supervises the drawing of too small walls, the creation of microenclosures without constructive sense, the false encounters and the concordance among plans. This can require an adaptation period to SONarchitect drawing method. Now the engineer has to make a general approach of how and what to draw from a realistic plan of the building for making an easier analysis of the results and handling, and what is more important, the precision of those results, avoiding tricky drawings that might result mistaken and compute a different building than desired.

Due to the restrictions for the flexibility must be limited, even with the automatic supervision, it is highly recommended to pay special attention to the project coherence during the drawing, for avoiding computation surprises. In particular, drawing similar plans from imported templates, it is recommended to use the magnet and snap to the template only in the first floor, drawing the other plans using the magnet to the previous plans having the template only as a visual guide. Thus, it is guaranteed a correct correspondence among plans, without fake encounters, even in the common case that the templates has light deviations among them.

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Smart drawing is one of the keys that make possible to successfully apply the ISO 12354 to real buildings. We have to constrain the coincidence of walls from one floor to the others, otherwise the method in ISO 12354 cannot be applied. If you try to draw a wall which is slightly tilted respect to a wall in the lower floor, we will snap the upper wall to be perfectly coincident with the lower. In the same way, we do not allow very small walls, which may pervert the ISO 12354 computation method (just recall the influence of wall area in R'), so that, we do not allow to draw lines of less than 20 cm. This two measures, which both have higher priority than the ortho lock, lead to a natural simplification of the building design which corresponds with a proper specification of the acoustical design according to ISO 12354.

At the beginning, you may be a little puzzled about this behaviour of the drawing pen. But as soon as you get used to its obstinate way, the design process is greatly enhanced and fastened.

14.2 "Some materials are missing in the building description"?

This warning appears when you press Calculate button and one or more of the constructive solutions of the building are unassigned.

The first empty material element is highlighted in the drawing.

All the elements (except linings) must be assigned. Also the roofs, even if the floor of that roof is not the last one: SONarchitect verifies this for avoiding user errors when patios appear.

14.3 How can I model the junction I want?

SONarchitect ISO computes all the acoustic insulation levels according to EN ISO 12354.

The sound transmission between flanks is determined by the vibration reduction index of the junction. This Kij coefficient is calculated by means of the models in the norm.

SONarchitect only identifies the topology and materials in the junction and whether there is an elastic junction or not and calculates the Kij coefficient.

You can see some of the junctions examples in the Junctions section.

14.4 What do represent the lines of the drawing?

You could also make this question as, which are the real dimensions of the walls, slabs...?

These lines are representing the midlines of every vertical partition: wall or façade.

When you are drawing over a DXF template you can see the drawing of a wall with its real

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thickness. You must place the SONarchitect ISO line in the middle of both lines that configure the real wall.

14.5 Can I calculate the insulation of a tilted roof?

The EN ISO 12354 only model horizontal slabs and roofs.

You must approximate your roof to a horizontal one. Use the virtual slab tool where needed.

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Thank you for choosing SONarchitect ISO

The Sound of Numbers S.L. team.